Rinnai®

Tankless Water Heater Service Manual

This manual provides service information for the models below. This table cross references each model to the applicable page number for internal component replacement instructions.

MODELS	DIAGNOSTICS	WIRE DIAGRAM	GAS CONTROL	FAN	PC BOARD	WATER FLOW CONTROL	HEAT EXCHANGER
R/C42e, R/C53e	10	28	41	49	54	59	69
R70e, R/C85e(PLUS)	12	29	43	50	56	65	72
R/C53i(PLUS), R/C85i(PLUS)	12	30	43	51	56	65	76
R/C98e(ASME)	14	31	45	52	56	67	80
R/C98i(ASME)	14	31	45	52	56	67	82
V53e, R63LSe	16	32	41	49	55	60	69
R50LSi, R75LSi-VA	18	33	43	51	56	63	76
R63LSe2, R75LSe-VA	18	33	43	50	56	63	72
R94LSe-VA	18	33	43	50	56	63	72
R94LSi-VA	18	33	43	51	56	63	76
R75LSe-VB	20	34	47	50	56	63	72
R75LSi-VB	20	34	47	51	56	63	76
R94LSe-VB	20	34	47	50	56	63	72
R94LSi-VB	20	34	47	51	56	63	76
V53i	20	35	43	51	56	63	76
R98LSe(ASME)	22	36	45	52	58	67	80
R98LSi(ASME)	22	36	45	52	58	67	82
RC80HPe	24	37	47	53	56	68	85
RC80HPi	24	37	47	53	56	68	88
RC98HPe	26	38	48	53	56	68	91
RC98HPi	26	38	48	53	56	68	94

Key to Trade Names in this Manual:

R/C — Indicates both the residential and commercial versions. R/C42e includes R42e and C42e.

RC — Indicates condensing water heater models.

(PLUS) — Indicates that the Designer Plus models are included. R/C85ePLUS includes R85e, C85e, and R85ePLUS. On the side of the water heater, the trade name includes a “D”, as in R85De.

(ASME) — Indicates that the ASME models are included. R98LSe(ASME) includes the R98LSe and R98LSeASME.

-VA,-VB — The trade names R75LSe, R75LSi, R94LSe, and R94LSi have been given to both the VA and VB series of water heaters. Pay close attention to the particular model number when referencing electrical diagnostics, wire diagrams, gas pressures, replacement instructions, and for parts. When there is a difference –VA or –VB will be specified.

Some of the trade names for models were changed to indicate that their cartons included isolation valves and a pressure relief valve. For service and repair purposes the table below shows the equivalent models.

Model with valves in carton	Equivalent Model
RV53e	V53e
RV53i	V53i
RL75e	R75LSe-VB
RL75i	R75LSi-VB
RL94e	R94LSe-VB
RL94i	R94LSi-VB
RC80e	RC80HPe
RC80i	RC80HPi
RC98e	RC98HPe
RC98i	RC98HPi

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General Information

Safety Definitions

This is the safety alert symbol. This symbol alerts you to potential hazards that can kill or hurt you and others.

⚠ DANGER Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It may also be used to alert against unsafe practices.

Using this Manual

Repairs should be performed by a qualified service technician.

The following information can be referenced for additional information.

- Operation and Installation Manual
- Hot Water System Design Manual
- Technical Sheets
- Technical Bulletins

Technical Support

Technicians are available to assist in servicing issues. Contact Rinnai Technical Services at 1-800-621-9419.

Recommended Tools

- Volt/Ohm/Amp meter with test probes
- Digital manometer or U tube type manometer with 14 inch water column (W.C.) scale, a hose and two 1/8 inch taps
- assorted wrenches including a 3/16 Allen wrench
- assorted screw drivers
- leak solution or leak detector
- Teflon tape

⚠ WARNING

There are a number of live tests that are required when fault finding this product. Extreme care should be used at all times to avoid contact with energized components inside the water heater. Before checking for resistance readings disconnect the power source to the unit and isolate the item from the circuit (unplug it).

⚠ CAUTION

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.

If any of the original wire as supplied with the appliance must be replaced, it must be replaced with type 18 AWG wire or its equivalent.

Specifications

V Series - Commercial - Outdoor

Trade Name	Model	Max. BTU	Min. BTU	Max Flow [1] gal/min (liters/min)	Temperature Range
C42e	**REU-V1616WC**	120,000	17,100 (NG) 17,800 (LP)	4.2 (16)	120 - 185 ºF (49-85 ºC)
C53e	**REU-V2020WC**	150,000	19,000 (NG) 20,200 (LP)	5.3 (20)	120 - 185 ºF (49-85 ºC)
C85e	**REU-V2532WC**	199,000	15,000	8.5 (32)	98 - 185 ºF (37-85 ºC)
C85ePLUS	**REU-V2532WCD**	199,000	15,000	8.5 (32)	98 - 185 ºF (37-85 ºC)
C98e	**REU-V3237WC**	237,000	19,000	9.8 (37)	98 - 185 ºF (37-85 ºC)
C98eASME	**REU-V3237WC-ASME**	237,000	19,000	9.8 (37)	98 - 185 ºF (37-85 ºC)

V Series - Commercial - Indoor

Trade Name	Model	Max. BTU	Min. BTU	Max Flow [1] gal/min (liters/min)	Temperature Range
C53i	**REU-V2520FFUC**	180,000	15,000	5.3 (20)	120 - 185 ºF (49-85 ºC)
C53iPLUS	**REU-V2520FFUCD**	180,000	15,000	5.3 (20)	120 - 185 ºF (49-85 ºC)
C85i	**REU-V2532FFUC**	180,000	15,000	8.5 (32)	98 - 185 ºF (37-85 ºC)
C85iPLUS	**REU-V2532FFUCD**	180,000	15,000	8.5 (32)	98 - 185 ºF (37-85 ºC)
C98i	**REU-V3237FFUC**	237,000	19,000	9.8 (37)	98 - 185 ºF (37-85 ºC)
C98iASME	**REU-V3237FFUC-ASME**	237,000	19,000	9.8 (37)	98 - 185 ºF (37-85 ºC)

V Series - Residential - Outdoor

Trade Name	Model	Max. BTU	Min. BTU	Max Flow [1] gal/min (liters/min)	Temperature Range
R42e	**REU-V1616W**	120,000	17,100 (NG) 17,800 (LP)	4.2 (16)	98 - 140 ºF (37-60 ºC)
R53e	**REU-V2020W**	150,000	19,000 (NG) 20,200 (LP)	5.3 (20)	98 - 140 ºF (37-60 ºC)
R70e	**REU-V2526W**	199,000	15,000	7.0 (26)	98 - 140 ºF (37-60 ºC)
R85e	**REU-V2532W**	199,000	15,000	8.5 (32)	98 - 140 ºF (37-60 ºC)
R85ePLUS	**REU-V2532WD**	199,000	15,000	8.5 (32)	98 - 140 ºF (37-60 ºC)
R98e	**REU-V3237W**	237,000	19,000	9.8 (37)	98 - 140 ºF (37-60 ºC)
R98eASME	**REU-V3237W-ASME**	237,000	19,000	9.8 (37)	98 - 140 ºF (37-60 ºC)

V Series - Residential - Indoor

Trade Name	Model	Max. BTU	Min. BTU	Max Flow [1] gal/min (liters/min)	Temperature Range
R53i	**REU-V2520FFU**	180,000	15,000	5.3 (20)	98 - 140 ºF (37-60 ºC)
R53iPLUS	**REU-V2520FFU**	180,000	15,000	5.3 (20)	98 - 140 ºF (37-60 ºC)
R85i	**REU-V2532FFU**	180,000	15,000	8.5 (32)	98 - 140 ºF (37-60 ºC)
R85iPLUS	**REU-V2532FFUD**	180,000	15,000	8.5 (32)	98 - 140 ºF (37-60 ºC)
R98i	**REU-V3237FFU**	237,000	19,000	9.8 (37)	98 - 140 ºF (37-60 ºC)
R98iASME	**REU-V3237FFU-ASME**	237,000	19,000	9.8 (37)	98 - 140 ºF (37-60 ºC)

[1] Minimum activation flow is approximately 0.6 gallons/minute (2.3 liters/min)

Specifications

VA Series (LS Series) - Residential or Commercial - Outdoor

Trade Name	Model	Max. BTU	Min. BTU	Max Flow [1] gal/min (liters/min)	Temperature Range
R63LSe	**REU-VA2024WD-US**	150,000	21,500 (NG) 20,600 (LP)	6.3 (24)	98 - 140 ºF (37-60 ºC) [2]
R63LSe2	**REU-VA2024WD(A)-US**	150,000	15,000	6.3 (24)	
R75LSe	**REU-VA2528WD-US**	199,000	15,000	7.5 (28)	
R75LSe	**REU-VA2528WD(A)-US** **REU-VA2528WD(A)-UC**	180,000	15,000	7.5 (28)	
R94LSe	**REU-VA2535WD-US** **REU-VA2535WD-UC**	199,000	15,000	9.4 (35)	98 - 140 ºF (37-60 ºC) [3]
R98LSe	**REU-VA3237W-US**	237,000	19,000	9.8 (37)	
R98LSeASME	**REU-VA3237W-ASME**	237,000	19,000	9.8 (37)	

VA Series (LS Series) - Residential or Commercial - Indoor

Trade Name	Model	Max. BTU	Min. BTU	Max Flow [1] gal/min (liters/min)	Temperature Range
R50LSi	**REU-VA2019FFUD-US**	150,000	15,000	5.0 (19)	98 - 140 ºF (37-60 ºC) [2]
R75LSi	**REU-VA2528FFUD-US**	199,000	15,000	7.5 (28)	
R75LSi	**REU-VA2528FFUD(A)-US** **REU-VA2528FFUD(A)-UC**	180,000	15,000	7.5 (28)	
R94LSi	**REU-VA2535FFUD-US** **REU-VA2535FFUD-UC**	199,000 (NG) 190,000 (LPG)	15,000	9.4 (35)	98 - 140 ºF (37-60 ºC) [3]
R98LSi	**REU-VA3237FFU-US**	237,000	19,000	9.8 (37)	
R98LSiASME	**REU-VA3237FFU-ASME**	237,000	19,000	9.8 (37)	

VA Series - Residential - Outdoor

Trade Name	Model	Max. BTU	Min. BTU	Max Flow [1] gal/min (liters/min)	Temperature Range
V53e	**REU-VAM1620W-US**	120,000	19,000 (NG) 20,200 (LP)	5.3 (20)	98 - 140 ºF (37-60 ºC)

[1] Minimum activation flow is approximately 0.6 gallons/minute (2.3 liters/min)

[2] Max temperature is 160 ºF (71 ºC) with the MCC-91 controller for commercial and hydronic applications only.

[3] Max temperature is 185 ºF (85 ºC) with the MCC-91 controller for commercial and hydronic applications only.

Specifications

VB Series (LS Series) - Residential or Commercial - Outdoor

Trade Name	Model	Max. BTU	Min. BTU	Max Flow [1] gal/min (liters/min)	Temperature Range
R75LSe, RL75e	**REU-VB2528WD-US**	180,000	9,900 (NG) 10,300 (LPG)	7.5 (28)	98 - 140 ºF (37-60 ºC) [2]
R94LSe, RL94e	**REU-VB2735WD-US**	199,000	9,900 (NG) 10,300 (LPG)	9.4 (35)	98 - 140 ºF (37-60 ºC) [3]

VB Series (LS Series) - Residential or Commercial - Indoor

Trade Name	Model	Max. BTU	Min. BTU	Max Flow [1] gal/min (liters/min)	Temperature Range
R75LSi, RL75i	**REU-VB2528FFUD-US**	180,000	9,900 (NG) 10,300 (LPG)	7.5 (28)	98 - 140 ºF (37-60 ºC) [2]
R94LSi, RL94i	**REU-VB2735FFUD-US**	199,000 (NG) 190,000 (LPG)	9,900 (NG) 10,300 (LPG)	9.4 (35)	98 - 140 ºF (37-60 ºC) [3]

VB Series - Residential - Indoor

Trade Name	Model	Max. BTU	Min. BTU	Max Flow [4] gal/min (liters/min)	Temperature Range
V53i, RV53i	**REU-VB2020FFU-US**	150,000	15,000	5.3 (20)	98 - 140 ºF (37-60 ºC)

Condensing Series - Residential or Commercial - Outdoor

Trade Name	Model	Max. BTU	Min. BTU	Max Flow [1] gal/min (liters/min)	Temperature Range
RC80HPe, RC80e	**REU-KA2530WD-US**	157,000	9,500 (NG) 10,300 (LPG)	8.0 (30)	98 - 140 ºF (37-60 ºC) [3]
RC98HPe, RC98e	**REU-KA3237WD-US**	199,000	9,500 (NG) 10,300 (LPG)	9.8 (37)	

Condensing Series - Residential or Commercial - Indoor

Trade Name	Model	Max. BTU	Min. BTU	Max Flow [1] gal/min (liters/min)	Temperature Range
RC80HPi, RC80i	**REU-KA2530FFUD-US**	157,000	9,500 (NG) 10,300 (LPG)	8.0 (30)	98 - 140 ºF (37-60 ºC) [3]
RC98HPi, RC98i	**REU-KA3237FFUD-US**	199,000	9,500 (NG) 10,300 (LPG)	9.8 (37)	

[1] Minimum activation flow is approximately 0.4 gallons/minute (1.5 liters/min); minimum flow is approximately 0.26 gallons/minute (1 liter/min).

[2] Max temperature is 160 ºF (71 ºC) with the MCC-91 controller for commercial and hydronic applications only.

[3] Max temperature is 185 ºF (85 ºC) with the MCC-91 controller for commercial and hydronic applications only.

[4] Minimum activation flow is approximately 0.6 gallons/minute (2.3 liters/min).

Diagnostic Codes

The Rinnai water heater has the ability to check its own operation continuously. If a fault occurs, an error code will flash on the display of the remote controller. This assists with diagnosing the fault and may enable you to overcome a problem without a service call.

⚠ WARNING Some of the checks below may need to be done by a qualified service technician. Call a service technician for any remedy that involves gas or electricity. Call a service technician if you have any doubt or reservation about performing the remedy yourself.

Accessing Operating Information

Models MC-91 and MCC-91

To display the most recent error codes press and hold the "On/Off" button for 2 seconds. While holding the "On/Off" button press the ▲ button. The last 9 error codes will flash one after the other. To exit this mode press the "On/Off" and ▲ button as before.

To display the water flow through the water heater press and hold the ▲ button for 2 seconds and without releasing the ▲ button press the "On/Off" button.

To display the outlet water temperature press and hold the ▼ button for 2 seconds and without releasing the ▼ button press the "On/Off" button.

Operation

1. **Water Flow Begins.**
   - Water Flow Sensor sends pulses to the PC Board.
   - PC Board senses flow.
   - Firing Sequence begins when the flow exceeds the minimum activation flow rate.

2. **Firing Sequence.**
   - PC Board monitors inlet/outlet water temperature, temperature set point, and water flow rate.
   - Combustion fan energized. Purges combustion chamber.
   - Spark igniter begins sparking.
   - Gas control valve opens to minimum fire rate.
   - Flame rod(s) proves ignition.
   - Spark igniter stops sparking.

3. **Normal Operation.**
   - PC Board monitors flame rod, fan motor frequency, outlet water temperature, controller temperature set point and water flow rate.
   - Gas control valve modulates gas input to required firing rate.
   - Combustion fan speed is adjusted for the required firing rate.
   - Water flow control valve is adjusted as needed.

4. **Shut-down Sequence.**
   - Shut-down begins when the PC Board senses the minimum flow rate which is 0.26 - 0.5 gpm depending on model.
   - Gas control valve closes.
   - Water flow control valve resets to standby position.
   - Combustion fan runs for a short period of time at low speed.

5. **Standby Mode.**
   - PC Board monitors water temperature and remote controls.
   - Freeze protection is activated as needed.

Diagnostic Codes

Code	Definition	Remedy
02	No burner operation during freeze protection mode **ONLY FOR NON-CONDENSING MODELS**	Service Call
03	Power interruption during Bath Fill (Water will not flow when power returns).	Turn off all hot water taps. Press ON/OFF twice.
10	Air Supply or Exhaust Blockage	Ensure Rinnai approved venting materials are being used. Check that nothing is blocking the flue inlet or exhaust. Check all vent components for proper connections. Ensure vent length is within limits. For non-condensing models, ensure condensation collar was installed correctly. Verify dip switches are set properly. Check fan for blockage. Check the fins in the heat exchanger. For condensing models, Burner Sensor Error (see code 31)
11	No Ignition	Check that the gas is turned on at the water heater, gas meter, or cylinder. Ensure gas type and pressure is correct. Ensure gas line, meter, and/or regulator is sized properly. Bleed all air from gas lines. Verify dip switches are set properly. Ensure appliance is properly grounded. Disconnect EZConnect or MSA controls to isolate the problem. Ensure igniter is operational. Check igniter wiring harness for damage. Check gas solenoid valves for open or short circuits. Remove burner cover and ensure all burners are properly seated. Remove burner plate and inspect burner surface for condensation or debris. If flame is visible, check the flame rod circuit.
12	Flame Failure	Check that the gas is turned on at the water heater and gas meter. Check for obstructions in the flue outlet. Ensure gas line, meter, and/or regulator is sized properly. Ensure gas type and pressure is correct. Bleed all air from gas lines. Ensure proper Rinnai venting material was installed. For non-condensing models, ensure condensation collar was installed properly. Ensure vent length is within limits. Verify dip switches are set properly. Ensure appliance is properly grounded. Disconnect keypad. Disconnect EZConnect or MSA controls to isolate the problem. Check power supply for loose connections. Check power supply for proper voltage and voltage drops. Ensure flame rod wire is connected. Ensure flame rod is in proper position (wire should connect at 6 o'clock position). Remove flame rod and check for carbon build-up; clean with sand paper or emery cloth. Disconnect and reconnect all wiring harnesses on unit and PC board. Check all components for electrical short. Check gas solenoid valves for open or short circuits. Remove burner plate and inspect burner surface for condensation or debris. Check the ground wire for the PC board.
14	Thermal Fuse	Check gas type of unit and ensure it matches gas type being used. Check for restrictions in air flow around unit and vent terminal. Check for low water flow in a circulating system causing short-cycling. Ensure dip switches are set to the proper position. Check for foreign materials in combustion chamber and/or exhaust piping. Check heat exchanger for cracks and/or separations. Check heat exchanger surface for hot spots which indicate blockage due to scale build-up. Refer to instructions in manual for flushing heat exchanger. Hard water must be treated to prevent scale build up or damage to the heat exchanger. Measure resistance of safety circuit. Ensure high fire and low fire manifold pressure is correct. Check for improper conversion of product.
16	Over Temperature Warning	Check for restrictions in the intake and exhaust system. Check for low water flow in a circulating system causing short-cycling. Check for foreign materials in combustion chamber and/or exhaust piping. Check for blockage in the heat exchanger.

Diagnostic Codes

Code	Definition	Remedy
25	Condensate Trap Error **ONLY FOR CONDENSING MODELS**	Condensate container is full. Check condensate drain for blockage. Replace condensate trap.
31	Burner Sensor Error **ONLY FOR VB AND CONDENSING INDOOR MODELS**	Measure resistance of sensor. Replace sensor.
32	Outgoing Water Temperature Sensor	Check sensor wiring for damage. Measure resistance of sensor. Clean sensor of scale build-up. Replace sensor.
33	Heat Exchanger Outgoing Temperature Sensor	Check sensor wiring to be sure it has not been short circuited. Measure resistance of sensor. Clean sensor of scale build-up. Replace sensor.
34	Combustion Air Temperature Sensor **ONLY FOR INDOOR NON-CONDENSING MODELS (EXCEPT R98LSi)**	Check for restrictions in the intake and exhaust system. Check sensor wiring for damage. Measure resistance of sensor. Clean sensor of scale build-up. Check the fan blade to be sure it is tight on motor shaft and is in good condition. Replace sensor.
52	Modulating Solenoid Valve Signal Abnormal	Check modulating gas solenoid valve wiring harness for loose or damaged terminals. Measure resistance of valve coil.
61	Combustion Fan Failure	Ensure fan will turn freely. Check wiring harness to motor for damaged and/or loose connections. Measure resistance of motor winding. Check for proper voltage from PC board.
65	Water Flow Control	The water flow control valve has failed to close during the bath fill function. Immediately turn off the water and discontinue the bath fill function. Contact a state qualified or licensed contractor to service the appliance.
70	Sensor Harness Connection **ONLY FOR CONDENSING MODELS**	Check PC board switches (in the bank of 6 switches, #2 should be on for indoor models and off for outdoor models) Check the connection harness at the E connection on the PC board. Outdoor models should have 2 orange cables at #7 and 8 positions. Indoor models should not have cables at these positions. If this is incorrect then replace the sensor harness. Replace PC board
71	Solenoid Valve Circuit	For non-condensing, check wiring harness to all solenoids for damage and/or loose connections. Measure resistance of each solenoid valve coil. For condensing, replace PC board.
72	Flame Sensing Device	Verify flame rod is touching flame when unit fires. Check all wiring to flame rod. Remove flame rod and check for carbon build-up; clean with sand paper or emery cloth. Check inside burner chamber for any foreign material blocking flame at flame rod. Measure micro amp output of sensor circuit with flame present. Replace flame rod.
73	Burner Sensor Circuit **ONLY FOR VB AND CONDENSING INDOOR MODELS**	Check sensor wiring and PC board to be sure they have not been damaged. Replace sensor.
LC	Scale Build-up in Heat Exchanger (when checking maintenance code history, “00” is substituted for “LC”)	Flush heat exchanger. Refer to instructions in manual. Hard water must be treated to prevent scale build up or damage to the heat exchanger. Replace heat exchanger. NOTE: The LC code is the only code that will allow the unit to keep running. The display will alternate between the LC code and the temperature setting. The controller will continue to beep. The LC code will reset if power is turned off and then on.
No code	Nothing happens when water flow is activated.	**On controller, verify if unit is sensing flow. If not then check the items below. If unit is sensing flow then check the heat exchanger and outlet thermistors.** Clean inlet water supply filter. On new installations ensure hot and cold water lines are not reversed. Check for cold to hot cross over. Isolate circulating system if present. Turn off cold water to the unit, open pressure relief valve; if water continues to flow, there is bleed over in your plumbing. Verify you have at least the minimum flow rate required to fire unit. Verify turbine spins freely. Measure the resistance of the water flow control sensor. If the display is blank and clicking is coming from the unit, disconnect the water flow servo motor (RD, BL, BR, GY, YL). If the display come on then replace the water flow servo motor.

Electrical Diagnostic Points

R/C42e, R/C53e

Wire Color	Voltage	Resistance	Connector No.	Pin No.'s
(TR) Transformer				
Black - White	90 - 100 VAC	51-63 ohms	F2	1 ~ 2
Blue - Brown	108 - 132 VAC	51-63 ohms	F3	1 ~ 3
(SV1, SV2, SV3, POV) Gas Valve and Modulating Solenoids				
(Main) Pink - Black	80 - 100 VDC	1.7 - 2 K ohms	E1	1 ~ 2
(SV1) Black - Blue			E2	1 ~ 2
(SV2) Black - Yellow			E3	1 ~ 2
(POV) Pink - Pink	2 - 15 VDC	67 - 81 ohms	C2	1 ~ 2
(M) Water Flow Servo				
Red - Blue	11 - 13 VDC	22 - 26 ohms	B1	1 ~ 2
Gray - Brown	4 - 6 VDC	N/A	B1	6 ~ 3
Gray - Yellow	N/A	N/A	B1	6 ~ 5
Gray - Orange	11 - 14 VDC	N/A	B1	6 ~ 4
NOTE: At the B connector on the PCB: gray wire turns to black, orange wire turns to red				
(QS) Water Flow Sensor				
Black - Red	11 - 13 VDC	5.5 - 6.2 K ohms	B3	3 ~ 1
Yellow - Black	4 - 7 VDC	1 - 1.4 mega ohms	B3	2 ~ 3
(IG) Ignition System				
Gray - Gray	90 - 100 VAC	N/A	F1	1 ~ 2
(FM) Combustion Fan Motor				
Red - Black	6 - 45 VDC	N/A	A1	1 ~ 2
White - Black	5 - 10 VDC	9.2 - 9.4 K ohms	A1	2 ~ 4
Yellow - Black	11 ~ 13 VDC	3.5 - 3.9 K ohms	A1	2 ~ 3
With the meter set on hertz scale, 60-350 hertz should be across the red and yellow wires at terminals 2 and 3.				

Electrical Diagnostic Points

R/C42e, R/C53e

Wire Color	Voltage	Resistance	Connector No.	Pin No.'s
Thermal Fuse / Overheat Switch				
Red - Red	12 VDC	below 1 ohm	B, C	6 (B) ~ 1 (C)
Flame Rod				
Place one lead of the meter to the flame rod and the other to ground. Flame rod to ground should read 1 mega ohm with unit not running. With the unit running, 5-150 VAC should be read. If voltage range is incorrect then replace PC board. Set the meter to the µ amp scale and series the meter in line with the flame rod. Proper flame circuit should read 1 micro-amp or greater. If micro-amp range is incorrect then clean flame rod; replace flame rod if cleaning fails.				
Thermistors				
Check all thermistors by inserting meter leads into each end of the thermistor plug. Set the meter to the 20 K ohm scale and read resistance. Applying heat to the thermistor bulb should decrease the resistance. Applying ice to the thermistor bulb should increase the resistance. Typical resistance values are: 11.4-14 K ohm for 59°F; 6.4-7.8 K ohm for 86°F; 3.6-4.5 K ohm for 113°F; 2.2-2.7 K ohm for 140°F; 0.6-0.8 K ohm for 221°F				
Outgoing Water Thermistor				
White - White	see above		B4	1 ~ 2
Heat Exchanger Temperature Thermistor				
White - White	see above		B5	1 ~ 2
Surge Protector				
Blue - Brown	108 - 132 VAC	N/A	F4	1 ~ 2
Blue - Brown	108 - 132 VAC	N/A	F3	1 ~ 3
With the power off, check the continuity through the surge protector. Check by placing one meter lead on the top pin #1 and bottom pin #2. Check by placing one meter lead on the top pin #3 and bottom pin #1. If there is continuity across both sets of points, then the surge protector is good.				
Controller				
Terminals D1	10 - 13 VDC digital	1.5 - 1.9 K ohms	D	1 ~ 3
Frost Protection				
There are electrical heating elements mounted at different points to protect the water heater from freezing.				
heaters located on the hot water outlet line		26 - 30 ohms		
heater located on heat exchanger piping		81 - 86 ohms		
heater located on water flow sensor		16 - 19 ohms		
Amp fuses				
There are two inline 3 amp glass fuses. Remove the fuse and check continuity through it. If there is continuity then the fuse is good.				

Electrical Diagnostic Points

R70e, R/C85e(PLUS),
R/C53i(PLUS), R/C85i(PLUS)

Wire Color	Voltage	Resistance	Connector No.	Pin No.'s
(TR) Transformer				
Black - White	90 - 100 VAC	51-63 ohms	F9	1 ~ 2
Blue - Brown	108 - 132 VAC	51-63 ohms	F7	1 ~ 3
(SV1, SV2, SV3, POV) Gas Valve and Modulating Solenoids				
(Main) Pink - Black	80 - 100 VDC	1.7 - 2 K ohms	E1	1 ~ 2
(SV1) Black - Yellow			E2	1 ~ 2
(SV2) Black - Blue			E3	1 ~ 2
(SV3) Black - Brown			E4	1 ~ 2
(POV) Pink - Pink	2 - 15 VDC	67 - 81 ohms	C2	1 ~ 2
(M) Water Flow Servo				
Red - Blue	11 - 13 VDC	22 - 26 ohms	B1 outdoor models B2 indoor models	1 ~ 2
Gray - Brown	4 - 6 VDC	N/A		6 ~ 3
Gray - Yellow	N/A	N/A		6 ~ 5
Gray - Orange	11 - 14 VDC	N/A		6 ~ 4
NOTE: At the B connector on the PCB: gray wire turns to black, orange wire turns to red				
(QS) Water Flow Sensor				
Black - Red	11 - 13 VDC	5.5 - 6.2 K ohms	B1 outdoor models B2 indoor models	1 ~ 3
Yellow - Black	4 - 7 VDC	1 - 1.4 mega ohms		2 ~ 3
Bypass Flow Control (only on R/C85e, R/C85ePLUS, R/C85i, R/C85iPLUS)				
Brown - White	2 - 6 VDC (unit in operating mode)	15 - 35 K ohms	G1 (plug between bypass and PCB)	1 ~ 5
Orange - White				2 ~ 5
Yellow - White				3 ~ 5
Red - White/Ground				4 ~ 5
(IG) Ignition System				
Gray - Gray	90 - 100 VAC	N/A	F8	1 ~ 2
(FM) Combustion Fan Motor				
Red - Black	6 - 45 VDC	N/A	A1	1 ~ 2
White - Black	5 - 10 VDC	9.2 - 9.4 K ohms	A1	2 ~ 4
Yellow - Black	11 ~ 13 VDC	3.5 - 3.9 K ohms	A1	2 ~ 3
With the meter set on hertz scale, 60-350 hertz should be across the red and yellow wires at terminals 2 and 3.				

Electrical Diagnostic Points

R70e, R/C85e(PLUS),
R/C53i(PLUS), R/C85i(PLUS)

Wire Color	Voltage	Resistance	Connector No.	Pin No.'s
Thermal Fuse / Overheat Switch				
Red - Red	12 VDC	below 1 ohm	C3-B2 outdoor models C3-B3 indoor models	1 ~ 1
Flame Rod				
Place one lead of the meter to the flame rod and the other to ground. Flame rod to ground should read 1 mega ohm with unit not running. With the unit running, 5-150 VAC should be read. If voltage range is incorrect then replace PC board. Set the meter to the µ amp scale and series the meter in line with the flame rod. Proper flame circuit should read 1 micro-amp or greater. If micro-amp range is incorrect then clean flame rod; replace flame rod if cleaning fails.				
Thermistors				
Check all thermistors by inserting meter leads into each end of the thermistor plug. Set the meter to the 20 K ohm scale and read resistance. Applying heat to the thermistor bulb should decrease the resistance. Applying ice to the thermistor bulb should increase the resistance. Typical resistance values are: 11.4-14 K ohm for 59°F; 6.4-7.8 K ohm for 86°F; 3.6-4.5 K ohm for 113°F; 2.2-2.7 K ohm for 140°F; 0.6-0.8 K ohm for 221°F				
Outgoing Water Thermistor				
White - White	see above		B4 outdoor models B5 indoor models	1 ~ 2
Heat Exchanger Temperature Thermistor				
White - White	see above		B5 outdoor models B6 indoor models	1 ~ 2
Surge Protector				
Blue - Brown	108 - 132 VAC	N/A	F6	1 ~ 2
Blue - Brown	108 - 132 VAC	N/A	F7	1 ~ 3
With the power off, check the continuity through the surge protector. Check by placing one meter lead on the top pin #1 and bottom pin #2. Check by placing one meter lead on the top pin #3 and bottom pin #1. If there is continuity across both sets of points, then the surge protector is good.				
Controller				
Terminals D1	10 - 13 VDC digital	1.5 - 1.9 K ohms	D	1 ~ 3
Frost Protection				
There are electrical heating elements mounted at different points to protect the water heater from freezing.				
heaters located on the hot water outlet line		26 - 30 ohms		
heater located on heat exchanger piping		81 - 86 ohms		
heater located on water flow sensor		16 - 19 ohms		
Amp fuses				
There are two inline 3 amp glass fuses. Remove the fuse and check continuity through it. If there is continuity then the fuse is good.				

Electrical Diagnostic Points

R/C98e(ASME),
R/C98i(ASME)

Wire Color	Voltage	Resistance	Connector No.	Pin No.'s
(SV1, SV2, SV3, POV) Gas Valve and Modulating Solenoids				
(Main) Pink - Black	11 - 13 VDC	24 - 28 ohms	F1 (pins 1, 2)	4 ~ 5(F)
(SV1) Black - Red		37 - 43 ohms	F2 (pins 1, 2)	3 ~ 4(F)
(SV2) Black - Orange			F3 (pins 1, 2)	2 ~ 4(F)
(SV3) Black - Yellow			F4 (pins 1, 2)	1 ~ 4(F)
(POV) Orange - Orange	3 - 15 VDC	67 - 81 ohms	E2 (pins 1, 2)	3 ~ 4(E)
(M) Water Flow Servo				
Red - Blue	11 - 13 VDC	N/A	G6 (pins 1, 2)	5 ~ 6(G)
Gray - Brown (closed position)	below 1 VDC	Limiter On	G6 (pins 5, 3)	8 ~ 11(G)
	4 - 6 VDC	Limiter Off		
Gray - Yellow (open position)	below 1 VDC	Limiter On	G6 (pins 5, 4)	7 ~ 11(G)
	4 - 6 VDC	Limiter Off		
NOTE: At the G connector on the PCB: gray wire turns to black				
(QS) Water Flow Sensor				
Black - Red	11 - 13 VDC	N/A	G3 (pins 3, 1)	9 ~ 15(G)
Yellow - Black	4 - 7 VDC	N/A	G3 (pins 2, 3)	11 ~ 15(G)
Bypass Flow Control				
Brown - White	2 - 6 VDC (unit in operating mode)	15 - 35 K ohms	H1 (pins 1, 5)	1(H) ~ 9(G)
Orange - White			H1 (pins 2, 5)	3(H) ~ 9(G)
Yellow - White			H1 (pins 3, 5)	4(H) ~ 9(G)
Red - White/Ground			H1 (pins 4, 5)	2(H) ~ 9(G)
NOTE: At the G connector on the PCB: white wire turns to red				
(IG) Ignition System				
Gray - Gray	90 - 100 VAC	N/A	C1	1 ~ 2(C)
(FM) Combustion Fan Motor				
Red - Black	6 - 45 VDC	N/A	B1	1 ~ 2(B)
White - Black	5 - 10 VDC	N/A	B1	2 ~ 4(B)
Yellow - Black	11 ~ 13 VDC	N/A	B1	2 ~ 3(B)
With the meter set on hertz scale, 17-460 hertz should be across the white and black wires at terminals 2 and 4.				

Electrical Diagnostic Points

R/C98e(ASME),
R/C98i(ASME)

Wire Color	Voltage	Resistance	Connector No.	Pin No.'s
Thermal Fuse				
White - Red	12 VDC	below 1 ohm	G1 (red) pin 1 - E3 (white) pin 1	
Overheat Switch				
Red - Red	12 VDC	below 1 ohm	G2	1 ~ 2
Flame Rod				
Place one lead of the meter to the flame rod and the other to ground. With the unit running, 5-150 VAC should be read. Set the meter to the µ amp scale and series the meter in line with the flame rod. Proper flame circuit should read 1 µ amp or greater. If not, then remove the flame rod and check for carbon build-up. Clean with sand paper or emery cloth.				
Thermistors				
Check all thermistors by inserting meter leads into each end of the thermistor plug. Set the meter to the 20 K ohm scale and read resistance. Applying heat to the thermistor bulb should decrease the resistance. Applying ice to the thermistor bulb should increase the resistance. Typical resistance values are: 11.4-14 K ohm for 59°F; 6.4-7.8 K ohm for 86°F; 3.6-4.5 K ohm for 113°F; 2.2-2.7 K ohm for 140°F; 0.6-0.8 K ohm for 221°F				
Outgoing Water Thermistor				
White - White	see above		G5	1 ~ 2
Heat Exchanger Temperature Thermistor				
White - White	see above		G4	1 ~ 2
Surge Protector				
Black - White	108 - 132 VAC	N/A	D1	1 ~ 3
Black - White	108 - 132 VAC	N/A	D2	
With the power off, check the continuity through the surge protector. Check by placing one meter lead on the top pin #1 and bottom pin #2. Check by placing one meter lead on the top pin #2 and bottom pin #1. If there is continuity across both sets of points, then the surge protector is good.				
Controller				
Black - Black	10 - 13 VDC digital	N/A	A	1 ~ 3(A)
Frost Protection				
White - White	120 VAC *	150 ohms	D4	1 ~ 2
White - White	60 VAC *	360 ohms	D5	1 ~ 2
White - White	60 VAC*	360 ohms	D6	1 ~ 2
* only when Frost Sensing Switch (D3) is ON				
Amp fuses				
There are two inline 3 amp glass fuses. Remove the fuse and check continuity through it. If there is continuity then the fuse is good.				

Electrical Diagnostic Points

V53e, R63LSe

Wire Color	Voltage	Resistance	Connector No.	Pin No.'s
(SV1, SV2, SV3, POV) Gas Valve and Modulating Solenoids				
(Main) Pink - Black	11 - 13 VDC	37 - 43 ohms	F5	1 ~ 2
(SV1) Black - Blue		35 - 41 ohms	F6	1 ~ 2
(SV2) Black - Yellow		37 - 43 ohms	F7	1 ~ 2
(POV) Pink - Pink	2 - 15 VDC	67 - 81 ohms	F3	1 ~ 2
(M) Water Flow Servo				
Red - Blue	11 - 13 VDC	22 - 28 ohms	E5 (1, 2)	9 ~ 8 (E)
Gray - Brown	4 - 6 VDC	N/A	E5 (5, 3)	4 ~ 6 (E)
Gray - Yellow	N/A	N/A	E5 (5, 4)	4 ~ 7 (E)
NOTE: At the E connector on the PCB: gray wire turns to black				
(QS) Water Flow Sensor				
Black - Red	11 - 13 VDC	5.5 - 6.2 K ohms	E2	3 ~ 1
Yellow - Black	4 - 7 VDC	1 - 1.4 mega ohms	E2	2 ~ 3
(IG) Ignition System				
Gray - Gray	90 - 110 VAC	N/A	B1	1 ~ 2
(FM) Combustion Fan Motor				
Red - Black	6 - 45 VDC	N/A	D1	1 ~ 2
White - Black	5 - 10 VDC	9.2 - 9.4 K ohms	D1	4 ~ 2
Yellow - Black	11 ~ 13 VDC	3.5 - 3.9 K ohms	D1	3 ~ 2
With the meter set on hertz scale, 60-420 hertz should be across the white and black wires at terminals 2 and 4.				

Electrical Diagnostic Points

V53e, R63LSe

Wire Color	Voltage	Resistance	Connector No.	Pin No.'s
Thermal Fuse / Overheat Switch				
Blue - White (thermal fuse side)		below 1 ohm	E6 F1	1 ~ 1
Red - Blue (PCB side)	12 VDC		E6 F1	1 ~ 1
Flame Rod				
Place one lead of the meter to the flame rod and the other to ground. With the unit running, 5-150 VAC should be read. Set the meter to the µ amp scale and series the meter in line with the flame rod. Proper flame circuit should read 1 µ amp or greater. If not, then remove the flame rod and check for carbon and damage.				
Thermistors				
Check all thermistors by inserting meter leads into each end of the thermistor plug. Set the meter to the 20 K ohm scale and read resistance. Applying heat to the thermistor bulb should decrease the resistance. Applying ice to the thermistor bulb should increase the resistance. Typical resistance values are: 11.4-14 K ohm for 59°F; 6.4-7.8 K ohm for 86°F; 3.6-4.5 K ohm for 113°F; 2.2-2.7 K ohm for 140°F; 0.6-0.8 K ohm for 221°F				
Outgoing Water Thermistor				
White - White	see above		E4	1 ~ 2
Heat Exchanger Temperature Thermistor				
White - White	see above		E3	1 ~ 2
Surge Protector				
Black - White	108 - 132 VAC	N/A	C2	1 ~ 3
Blue - Brown	108 - 132 VAC	N/A	C1	
With the power off, check the continuity through the surge protector. Check by placing one meter lead on the top pin #1 and bottom pin #3. Check by placing one meter lead on the top pin #3 and bottom pin #1. If there is continuity across both sets of points, then the surge protector is good.				
Controller				
Terminals A1	10 - 13 VDC	1.5 - 3.0 K ohms	A	1 ~ 3
Frost Protection				
heaters located on the hot water outlet line		180 - 207 ohms		
heater located on heat exchanger piping		156 - 180 ohms		
heater located on water flow sensor		24 - 28 ohms		
Amp fuses				
There are two inline 3 amp glass fuses. Remove the fuse and check continuity through it. If there is continuity then the fuse is good.				

Electrical Diagnostic Points

R50LSi, R63LSe2, R75LSe-VA,
R75LSi-VA, R94LSe-VA, R94LSi-VA

Wire Color	Voltage	Resistance	Connector No.	Pin No.'s
(SV1, SV2, SV3, POV) Gas Valve and Modulating Solenoids				
(Main) Pink - Black	11 - 13 VDC	36.8 - 44.8 ohms	H5	1 ~ 2
(SV1) Black - Yellow			H6	1 ~ 2
(SV2) Black - Blue			H7	1 ~ 2
(SV3) Black - Brown			H8	1 ~ 2
(POV) Pink - Pink	2 - 15 VDC	67 - 81 ohms	H3	1 ~ 2
(M) Water Flow Servo				
Red - Blue	11 - 13 VDC	22 - 26 ohms	F7 (1, 2)	10 ~ 9 (F)
Gray - Brown	4 - 6 VDC	N/A	F7 (5, 3)	5 ~ 7 (F)
Gray - Yellow	N/A	N/A	F7 (5,4)	5 ~ 8 (F)
NOTE: At the F connector on the PCB: gray wire turns to black, orange wire turns to red				
(QS) Water Flow Sensor				
Black - Red	11 - 13 VDC	5.5 - 6.2 K ohms	F2	1 ~ 3
Yellow - Black	4 - 7 VDC	1 - 1.4 mega ohms	F2	2 ~ 3
Bypass Flow Control (only on R94LSe and R94LSi)				
Brown - White	2 - 6 VDC (unit in operating mode)	15 - 35 K ohms	G1	1 ~ 5
Orange - White				2 ~ 5
Yellow - White				3 ~ 5
Red - White/Ground				4 ~ 5
(IG) Ignition System				
Gray - Gray	90 - 110 VAC	N/A	C1	1 ~ 2
(FM) Combustion Fan Motor				
Red - Black	6 - 45 VDC	N/A	E1	1 ~ 2
White - Black	5 - 10 VDC	9.2 - 9.4 K ohms	E1	2 ~ 4
Yellow - Black	11 ~ 13 VDC	3.5 - 3.9 K ohms	E1	2 ~ 3
With the meter set on hertz scale, 60-420 hertz should be across the red and yellow wires at terminals 2 and 4.				

Electrical Diagnostic Points

R50LSi, R63LSe2, R75LSe-VA,
R75LSi-VA, R94LSe-VA, R94LSi-VA

Wire Color	Voltage	Resistance	Connector No.	Pin No.'s
Thermal Fuse / Overheat Switch				
Red - Red (thermal fuse side)		below 1 ohm	F6 H1	1 ~ 1
Red - Red (PCB side)	11 - 13 VDC		F6 H1	1 ~ 1
Flame Rod				
Place one lead of the meter to the flame rod and the other to ground. With the unit running, 5-150 VAC should be read. Set the meter to the µ amp scale and series the meter in line with the flame rod. Proper flame circuit should read 1 µ amp or greater. If not, then remove the flame rod and check for carbon and damage.				
Thermistors				
Check all thermistors by inserting meter leads into each end of the thermistor plug. Set the meter to the 20 K ohm scale and read resistance. Applying heat to the thermistor bulb should decrease the resistance. Applying ice to the thermistor bulb should increase the resistance. Typical resistance values are: 11.4-14 K ohm for 59°F; 6.4-7.8 K ohm for 86°F; 3.6-4.5 K ohm for 113°F; 2.2-2.7 K ohm for 140°F; 0.6-0.8 K ohm for 221°F				
Outgoing Water Thermistor				
White - White	see above		F5 (1, 1)	3 ~ 4 (F)
Heat Exchanger Temperature Thermistor				
Pink - White	see above		F4 (1, 1)	3 ~ 11 (F)
Intake Air Thermistor (only on R50LSi, R75LSi, R94LSi)				
Orange - White	see above		F3 (1, 1)	3 ~ 12 (F)
Surge Protector				
Black - White	108 - 132 VAC	N/A	D2	1 ~ 3
Blue - Brown	108 - 132 VAC	N/A	D1	1 ~ 3
With the power off, check the continuity through the surge protector. Check by placing one meter lead on the top pin #1 and bottom pin #3. Check by placing one meter lead on the top pin #3 and bottom pin #1. If there is continuity across both sets of points, then the surge protector is good.				
Controller				
Terminals B1	10 - 13 VDC	1.5 - 3.0 K ohms	B	1 ~ 3
Frost Protection				
There are electrical heating elements mounted at different points to protect the water heater from freezing.				
heaters located on the hot water outlet line		180 - 207 ohms		
heater located on heat exchanger piping		156 - 180 ohms		
heater located on water flow sensor		24 - 28 ohms		
Amp fuses				
There are two inline 3 amp glass fuses. Remove the fuse and check continuity through it. If there is continuity then the fuse is good.				

Electrical Diagnostic Points

V53i, R75LSe-VB, R75LSi-VB,
R94LSe-VB, R94LSi-VB

Heat Exchanger and Outgoing Water Temperature Thermistors:

Check all thermistors by inserting meter leads into each end of the thermistor plug. Set your meter to the 20 K scale and read resistance. Applying heat to the thermistor bulb should decrease the resistance. Applying ice to the thermistor bulb should increase the resistance.

Frost Protection:

This unit has frost protection heaters mounted at different points to protect the water heater from freezing.

Amp Fuses:

Indoor models have one inline (5) amp glass fuse. Outdoor models have one inline (3) amp glass fuse. Remove the fuse and check continuity through it. If you have continuity through the fuse then it is good. Otherwise the fuse is blown and must be replaced.

Flame Rod:

Place one lead of your meter to the flame rod and the other to ground. With the unit running you should read between 5-150 VAC. Set your meter to the micro amp scale. You should read 1 micro amp for proper flame circuit. In the event of low flame circuit remove the flame rod and check for carbon or damage.

COMPONENT	MEASUREMENT POINT		RANGE OF VALUE	REMARKS
	CN	WIRE COLOR		
TEMP CONTROLLER	A1	Bk-Bk	DC11-13V	
THERMAL FUSE	B1/E1	W-W	BELOW 1 Ω	
MOD. SOLENOID VALVE	B2	O-O	DC2-15V / 67-82 Ω	
MAIN SOLENOID VALVE	B3	P-Bk	DC11-13V / 37-43 Ω	
SOLENOID VALVE 1	B4	B-Bk (Y-Bk on V53i)		
SOLENOID VALVE 2	B5	Y-Bk (Bl-Bk on V53i)		
SOLENOID VALVE 3	B6	R-Bk		
SOLENOID VALVE 4	B7	O-Bk		NOT ON V53i, RV53i
FLAME ROD 1	B8	Y-FR	OVER 1 μ A (DURING OPERATION)	
FLAME ROD 2	M1	R-FR		NOT ON V53i, RV53i
SURGE PROTECTOR	C1	W-Bk	AC108-132V	
SURGE PROTECTOR	C2			
MAIN POWER CORD	C3			
ANTI FROST HEATER	C4	W-W	88-120 Ω	W (OUTDOOR) MODELS
			156-211 Ω	FFU (INDOOR) MODELS
IGNITOR	D1	Gy-Gy	AC108-132V (DURING IGNITION)	
HEAT EXCHANGER TH	E2	W-W	15ºC/59ºF: 11.4-14.0 kΩ	
OUTGOING WATER TH1	E3	W-W	30ºC/86ºF: 6.4-7.8 kΩ	
OUTGOING WATER TH2	E4	W-W	45ºC/113ºF: 3.6-4.5 kΩ 60ºC/140ºF: 2.2-2.7 kΩ	
AIR TEMPERATURE TH	E5	W-W	105ºC/221ºF: 0.6-0.8 kΩ	FFU (INDOOR) MODELS

Electrical Diagnostic Points

V53i, R75LSe-VB, R75LSi-VB, R94LSe-VB, R94LSi-VB

COMPONENT	MEASUREMENT POINT		RANGE OF VALUE	REMARKS
	CN	WIRE COLOR		
BURNER THERMISTOR	E6	Bk-Bk	15ºC/59ºF: 21.5-23.8 kΩ 30ºC/86ºF: 14.7-16.2 kΩ 200ºC/392ºF: 0.98-1.02 kΩ 400ºC/752ºF: 210.0-223.9 Ω 600ºC/1112ºF: 85.7-92.7 Ω	FFU (INDOOR) MODELS
WATER FLOW SENSOR	E7	R-Bk	DC11-13V	**R75LS, RL75, R94LS, RL94:** ON: 1.5L/MIN (20Hz) OFF: 1.0L/MIN (13Hz) **V53i, RV53i** ON: 2.4L/MIN OFF: 1.7L/MIN
		Y-Bk	DC4-7V (PULSE 20-300 Hz)	
BYPASS FLOW CONTROL	G1	Br-W	DC12V (DC2-6V DURING OPERATION) 15-35 Ω	R94LS, RL94 (2735) MODELS ONLY
		O-W		
		Y-W		
		R-W		
WATER FLOW CONTROL	G2	R-O	DC11-13V (DC5-7V DURING OPERATION)	
		P-O		
		B-O		
		W-O		
		R-P	30-50 Ω	
		B-W		
		Y-Gy	BELOW DC1V (LIMITER ON) DC4-6 (LIMITER OFF)	FULL OPEN POSITION
		Br-Gy		FULL CLOSE POSITION
COMBUSTION FAN	L1	R-Bk	DC15-46V	
		Y-Bk	DC11-13V	
		W-Bk	DC5-10V (PULSE 20-420 Hz)	

Electrical Diagnostic Points

R98LSe(ASME),
R98LSi(ASME)

Wire Color	Voltage	Resistance	Connector No.	Pin No.'s
(SV1, SV2, SV3, POV) Gas Valve and Modulating Solenoids				
(Main) Pink - Black	11 - 13 VDC	24 - 28 ohms	H3	1 ~ 2
(SV1) Black - Red		37 - 43 ohms	H4	1 ~ 2
(SV2) Black - Orange		37 - 43 ohms	H5	1 ~ 2
(SV3) Black - Yellow		37 - 43 ohms	H6	1 ~ 2
(POV) Orange - Orange	2 - 15 VDC	67 - 81 ohms	H2	1 ~ 2
(M) Water Flow Servo				
Red - Blue	11 - 13 VDC	22 - 28 ohms	F5 (1, 2)	9 ~ 10 (F)
Gray - Brown	4 - 6 VDC	N/A	F5 (5, 3)	5 ~ 7 (F)
Gray - Yellow	N/A	N/A	F5 (5, 4)	5 ~ 8 (F)
NOTE: At the F connector on the PCB: gray wire turns to black				
(QS) Water Flow Sensor				
Black - Red	11 - 13 VDC	5.5 - 6.2 K ohms	F2	1 ~ 3
Yellow - Black	4 - 7 VDC	1 - 1.4 mega ohms	F2	2 ~ 3
Bypass Flow Control				
Brown - White	2 - 6 VDC (unit in operating mode)	15 - 35 K ohms	G1	1 ~ 5
Orange - White				2 ~ 5
Yellow - White				3 ~ 5
Red - White/Ground				4 ~ 5
(IG) Ignition System				
Gray - Gray	90 - 110 VAC	N/A	C1	1 ~ 2
(FM) Combustion Fan Motor				
Red - Black	6 - 45 VDC	N/A	E1	1 ~ 2
White - Black	5 - 10 VDC	9.2 - 9.4 K ohms	E1	2 ~ 4
Yellow - Black	11 ~ 13 VDC	3.5 - 3.9 K ohms	E1	2 ~ 3
With the meter set on hertz scale, 60-420 hertz should be across the red and yellow wires at terminals 2 and 4.				

Electrical Diagnostic Points

R98LSe(ASME),
R98LSi(ASME)

Wire Color	Voltage	Resistance	Connector No.	Pin No.'s
Thermal Fuse / Overheat Switch				
Red - White	11 - 13 VDC	below 1 ohm	F6 H1	1 ~ 1
			F (pin 6), H (pin 12)	
Flame Rod				
Place one lead of the meter to the flame rod and the other to ground. With the unit running, 5-150 VAC should be read. Set the meter to the µ amp scale and series the meter in line with the flame rod. Proper flame circuit should read 1 µ amp or greater. If not, then remove the flame rod and check for carbon and damage.				
Thermistors				
Check all thermistors by inserting meter leads into each end of the thermistor plug. Set the meter to the 20 K ohm scale and read resistance. Applying heat to the thermistor bulb should decrease the resistance. Applying ice to the thermistor bulb should increase the resistance. Typical resistance values are: 11.4-14 K ohm for 59°F; 6.4-7.8 K ohm for 86°F; 3.6-4.5 K ohm for 113°F; 2.2-2.7 K ohm for 140°F; 0.6-0.8 K ohm for 221°F				
Outgoing Water Thermistor				
White - White	see above		F4 (1, 2)	3 ~ 4 (F)
Heat Exchanger Temperature Thermistor				
White - White	see above		F3	1 ~ 2
Pink - White	see above		F	3 ~ 11
Surge Protector				
Black - White	108 - 132 VAC	N/A	D2	1 ~ 3
Blue - Brown	108 - 132 VAC	N/A	D1	1 ~ 3
With the power off, check the continuity through the surge protector. Check by placing one meter lead on the top pin #1 and bottom pin #3. Check by placing one meter lead on the top pin #3 and bottom pin #1. If there is continuity across both sets of points, then the surge protector is good.				
Controller				
Terminals B1	10 - 13 VDC	1.5 - 3.0 K ohms	B	1 ~ 3
Frost Protection				
There are electrical heating elements mounted at different points to protect the water heater from freezing. Voltage through this circuit should be 120 VAC.				
heater located on the hot water outlet line		335 - 385 ohms		
heater located on heat exchanger piping		156 - 180 ohms		
heater located on water flow sensor		335 - 385 ohms		
Amp fuses				
There are two inline 3 amp glass fuses. Remove the fuse and check continuity through it. If there is continuity then the fuse is good.				

Heat Exchanger and Outgoing Water Temperature Thermistors:

Check all thermistors by inserting meter leads into each end of the thermistor plug. Set your meter to the 20 K scale and read resistance. Applying heat to the thermistor bulb should decrease the resistance. Applying ice to the thermistor bulb should increase the resistance.

Frost Protection:

This unit has frost protection heaters mounted at different points to protect the water heater from freezing.

Amp Fuses:

This unit has one inline (7) amp glass fuse. Remove the fuse and check continuity through it. If you have continuity through the fuse then it is good. Otherwise the fuse is blown and must be replaced.

Flame Rod:

Place one lead of your meter to the flame rod and the other to ground. With the unit running you should read between 5-150 VAC. Set your meter to the micro amp scale. You should read 1 micro amp for proper flame circuit. In the event of low flame circuit remove the flame rod and check for carbon or damage.

COMPONENT	MEASUREMENT POINT			RANGE OF VALUE
	CN	PINS	WIRE COLOR	
TEMP CONTROLLER	A	1-3	Bk-Bk	DC10-13V
THERMAL FUSE	B1 pin1 to E1 pin 1		R-R	BELOW 1 Ω
MOD. SOLE. VALVE (POV)	B2 (1-2), B (10-11)		B2: O-O	DC2-15V / 67-82 Ω
MAIN SOLE. VALVE (SV0)	B5 (1-2), B (7-8)		B5: P-Bk	DC11-13V / 37-43 Ω
SOLENOID VALVE 1	B6 (1-2), B (6-7)		B6: B-Bk	
SOLENOID VALVE 2	B7 (1-2), B (5-7)		B7: Y-Bk	
SOLENOID VALVE 3	B3 (1-2), B(4-7)		B3: R-Bk	
SOLENOID VALVE 4	B4 (1-2), B(3-7)		B4: O-Bk	
SURGE PROTECTOR	C1	1-3	Bk-W	AC108-132V
SURGE PROTECTOR	C2	1-3	W-W	
ANTI FROST HEATER	HOT WATER OUTLET LINE			10-20 Ω
	HEAT EXCHANGER PIPING			35-50 Ω
	WATER FLOW SENSOR, HOT WATER OUTLET, DRAIN CONNECTION			110-150 Ω
	LATENT HEAT EXCHANGER (INDOOR MODEL ONLY)			90-110 Ω
IGNITOR	D1	1-2	Gy-Gy	AC108-132V (DURING IGNITION)
HEAT EXCHANGER TH	E2 (1, 2), E(5-10)		W-W	15ºC/59ºF: 11.4-14.0 kΩ 30ºC/86ºF: 6.4-7.8 kΩ 45ºC/113ºF: 3.6-4.5 kΩ 60ºC/140ºF: 2.2-2.7 kΩ 105ºC/221ºF: 0.6-0.8 kΩ
OUTGOING WATER TH1	E3	1-2	W-W	
OUTGOING WATER TH2	E4	3-4	W-W	

Electrical Diagnostic Points

RC80HPe, RC80HPi

COMPONENT	MEASUREMENT POINT			RANGE OF VALUE
	CN	PINS	WIRE COLOR	
WATER FLOW SENSOR	E5	1-3	R-Bk	DC11-13V
		2-3	Y-Bk	DC4-7V; 1-1.4 MΩ
BYPASS FLOW CONTROL	G1	1-5	Br-W	DC2-6V DURING OPERATION 15-35 Ω
		2-5	O-W	
		3-5	Y-W	
		4-5	R-W	
WATER FLOW CONTROL	G2	3 or 4 - 8	R or P -O	DC5-7V DURING OPERATION
		1 or 2 - 8	B or W -O	
		3-4	R-P	30-50 Ω
		1-2	B-W	
		7-5	Y-Gy	BELOW DC1V (LIMITER ON) DC0-6 (LIMITER OFF)
		7-6	Br-Gy	
COMBUSTION FAN	L1	1-2	R-Bk	DC6-45V
		2-3	Y-Bk	DC11-13V; 3.5-3.9 kΩ
		2-4	W-Bk	DC5-10V; 9.2-9.4 kΩ; (PULSE 20-420 Hz)

Electrical Diagnostic Points

RC98HPe, RC98HPi

Heat Exchanger and Outgoing Water Temperature Thermistors:

Check all thermistors by inserting meter leads into each end of the thermistor plug. Set your meter to the 20 K scale and read resistance. Applying heat to the thermistor bulb should decrease the resistance. Applying ice to the thermistor bulb should increase the resistance.

Frost Protection:

This unit has frost protection heaters mounted at different points to protect the water heater from freezing.

Amp Fuses:

This unit has one inline (7) amp glass fuse. Remove the fuse and check continuity through it. If you have continuity through the fuse then it is good. Otherwise the fuse is blown and must be replaced.

Flame Rod:

Place one lead of your meter to the flame rod and the other to ground. With the unit running you should read between 5-150 VAC. Set your meter to the micro amp scale. You should read 1 micro amp for proper flame circuit. In the event of low flame circuit remove the flame rod and check for carbon or damage.

COMPONENT	MEASUREMENT POINT			RANGE OF VALUE
	CN	PINS	WIRE COLOR	
TEMP CONTROLLER	B1	1-3	Bk-Bk	DC10-13V
THERMAL FUSE	E1 pin 1 to B1 pin 1		R-W	BELOW 1 Ω
MOD. SOLE. VALVE (POV)	B2	1-2	O-O	DC2-15V / 67-81 Ω
MAIN SOLE. VALVE (SV0)	B3	1-2	P-Bk	DC11-13V / 24-28 Ω
SOLENOID VALVE 1	B4	1-2	Bl-Bk	DC11-13V / 37-43 Ω
SOLENOID VALVE 2	B5	1-2	Y-Bk	
SOLENOID VALVE 3	B6	1-2	R-Bk	
SOLENOID VALVE 4	B7	1-2	O-Bk	
SURGE PROTECTOR	C1	1-3	Bk-W	AC108-132V
SURGE PROTECTOR	C2	1-3	W-W	
ANTI FROST HEATER	HOT WATER OUTLET LINE			180-207 Ω
	HEAT EXCHANGER PIPING			156-180 Ω
	WATER FLOW SENSOR			24-28 Ω
IGNITOR	D1	1-2	Gy-Gy	AC90-110V (DURING IGNITION)
HEAT EXCHANGER TH	E2	1-2	W-W	15ºC/59ºF: 11.4-14.0 kΩ 30ºC/86ºF: 6.4-7.8 kΩ 45ºC/113ºF: 3.6-4.5 kΩ 60ºC/140ºF: 2.2-2.7 kΩ 105ºC/221ºF: 0.6-0.8 kΩ
OUTGOING WATER TH1	E4 pins 3,4 to E8 pins 1-2		W-W	

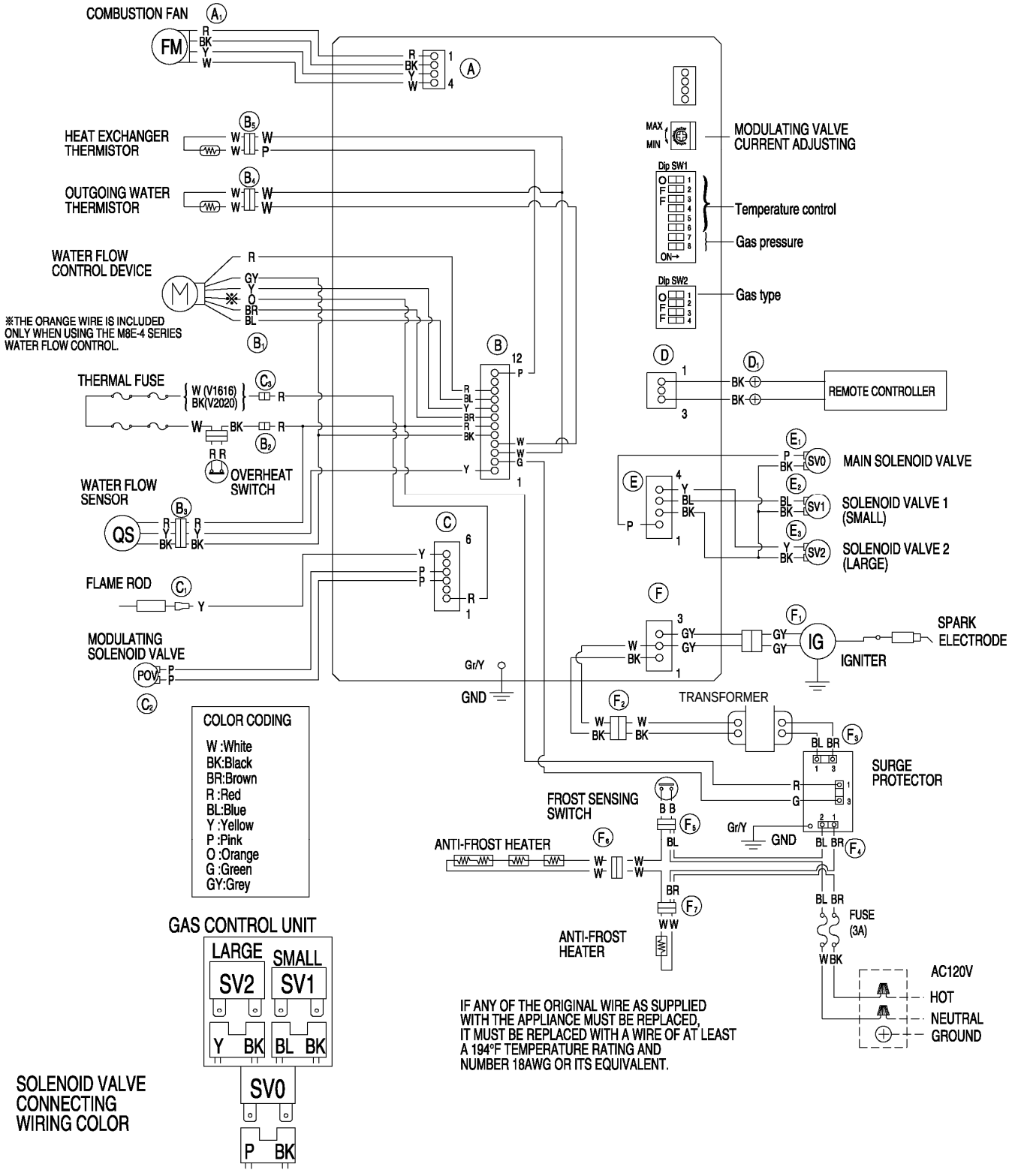
Electrical Diagnostic Points

RC98HPe, RC98HPi

COMPONENT	MEASUREMENT POINT			RANGE OF VALUE
	CN	PINS	WIRE COLOR	
WATER FLOW SENSOR	F2	1-3	R-Bk	DC11-13V; 5.5-6.2 kΩ
		2-3	Y-Bk	DC4-7V; 1-1.4 MΩ
BYPASS FLOW CONTROL	G1	1-5	Br-W	DC2-6V DURING OPERATION 15-35 Ω
		2-5	O-W	
		3-5	Y-W	
		4-5	R-W	
WATER FLOW CONTROL	G2	3 or 4 - 8	R or P -O	DC5-7V DURING OPERATION
		1 or 2 - 8	B or W -O	DC5-7V DURING OPERATION
		3-4	R-P	30-50 Ω
		1-2	B-W	30-50 Ω
		7-5	Y-Gy	BELOW DC1V (LIMITER ON) DC0-6 (LIMITER OFF)
		7-6	Br-Gy	BELOW DC1V (LIMITER ON) DC0-6 (LIMITER OFF)
COMBUSTION FAN	E1	1-2	R-Bk	DC6-45V
		2-3	Y-Bk	DC11-13V; 3.5-3.9 kΩ
		2-4	W-Bk	DC5-10V; 9.2-9.4 kΩ; (PULSE 20-420 Hz)

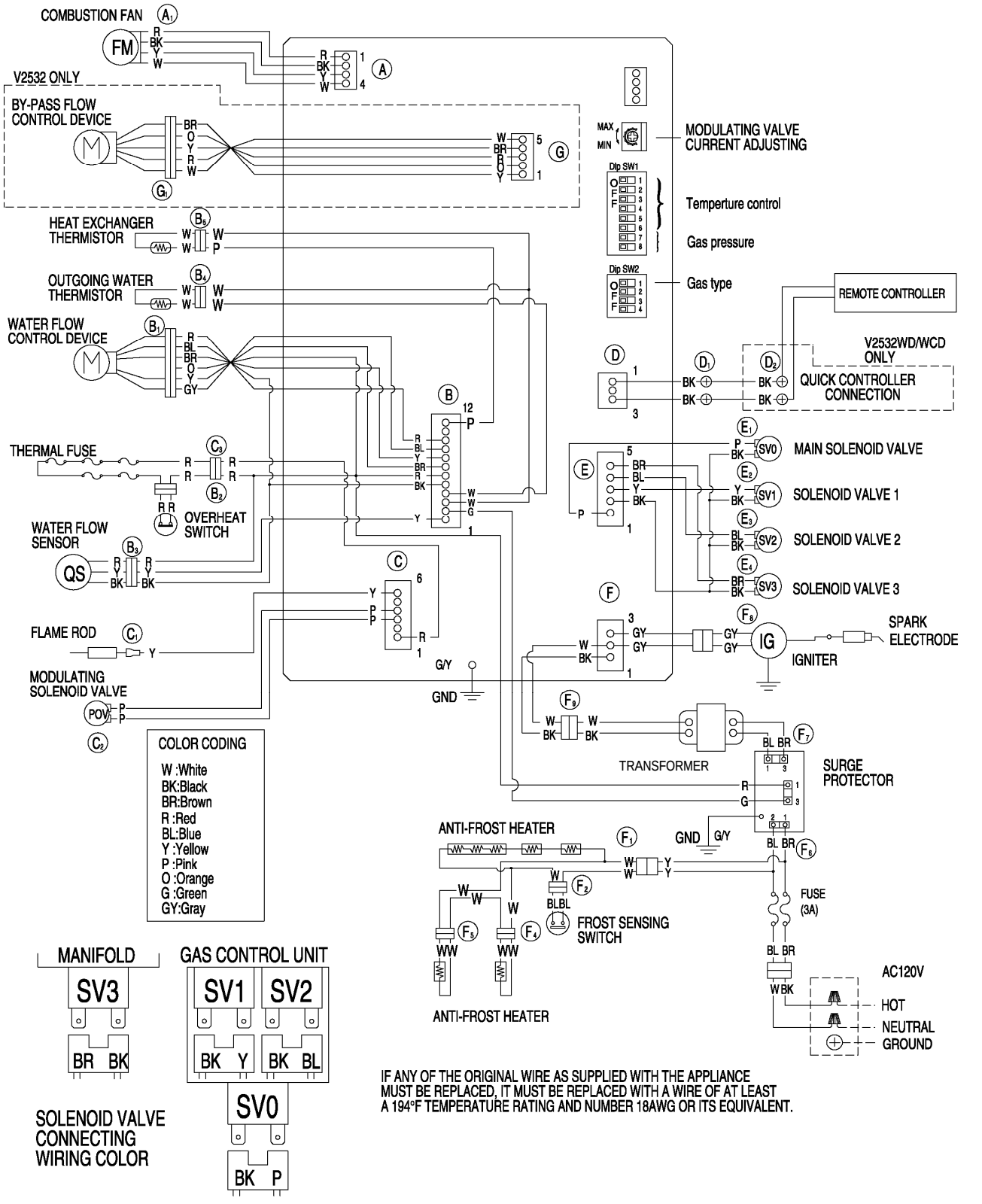
Wiring Diagram

R/C42e, R/C53e



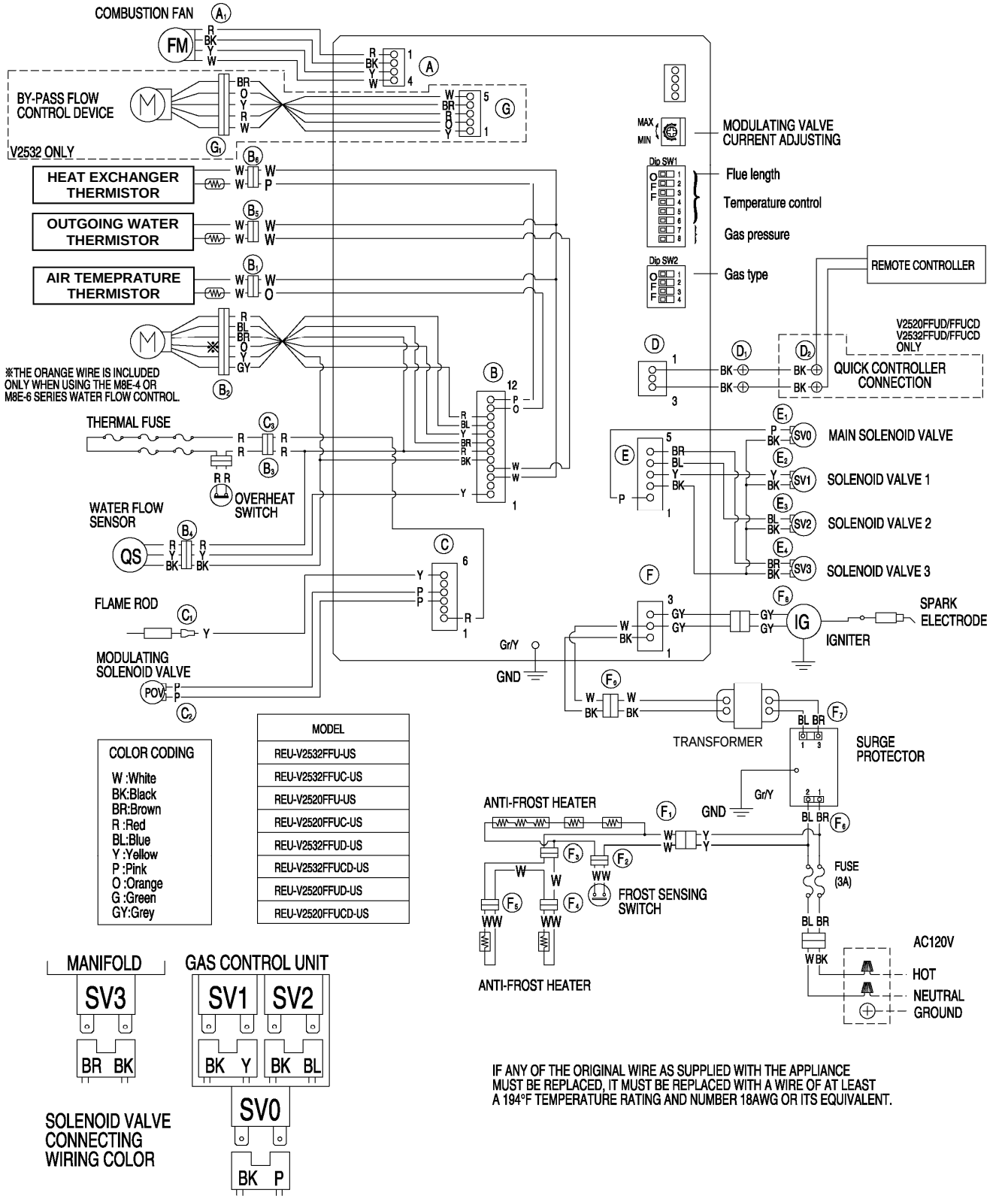
Wiring Diagram

R70e, R/C85e(PLUS)



Wiring Diagram

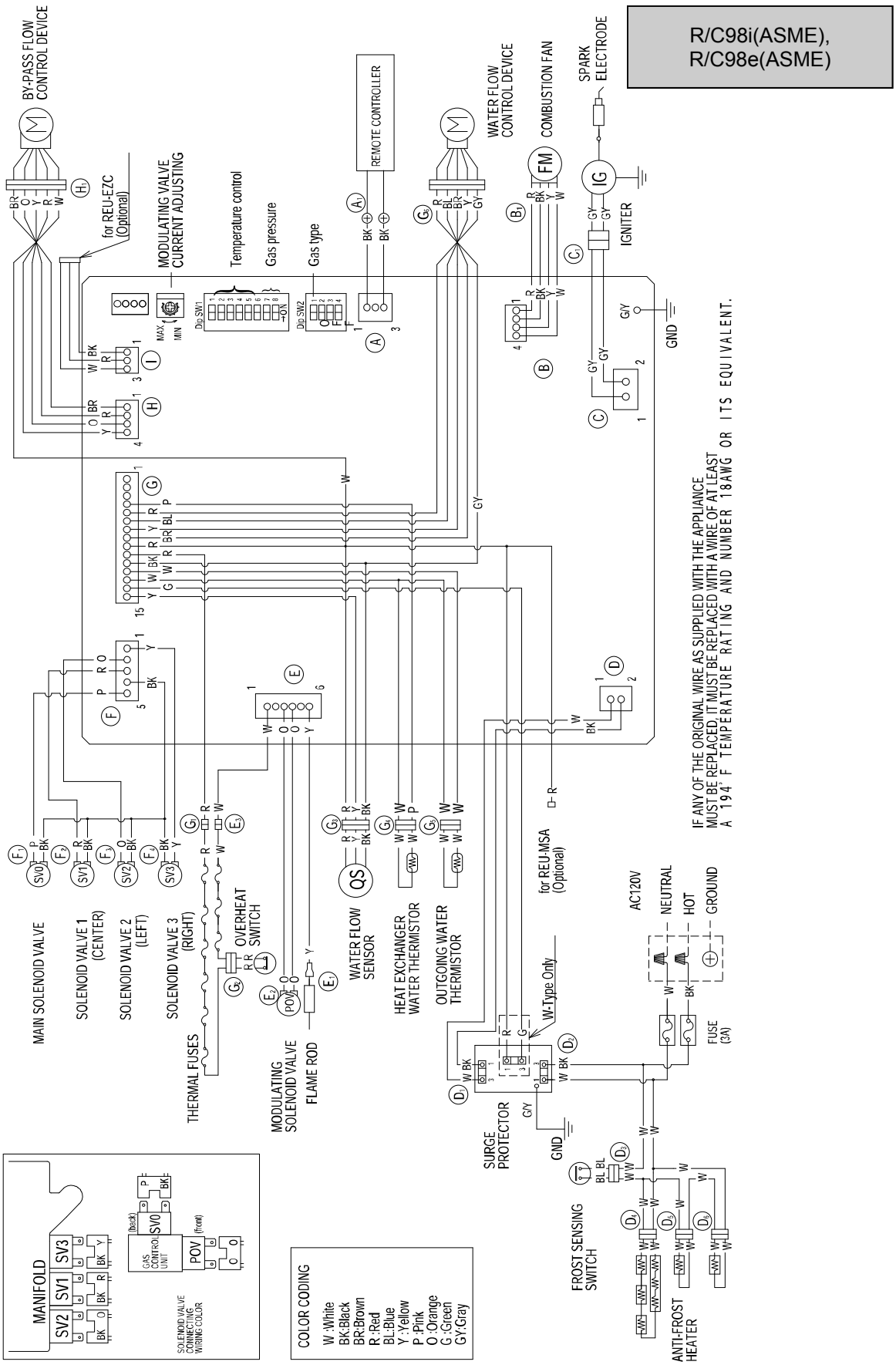
R/C53i(PLUS),
R/C85i(PLUS)



IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, IT MUST BE REPLACED WITH A WIRE OF AT LEAST A 194°F TEMPERATURE RATING AND NUMBER 18AWG OR ITS EQUIVALENT.

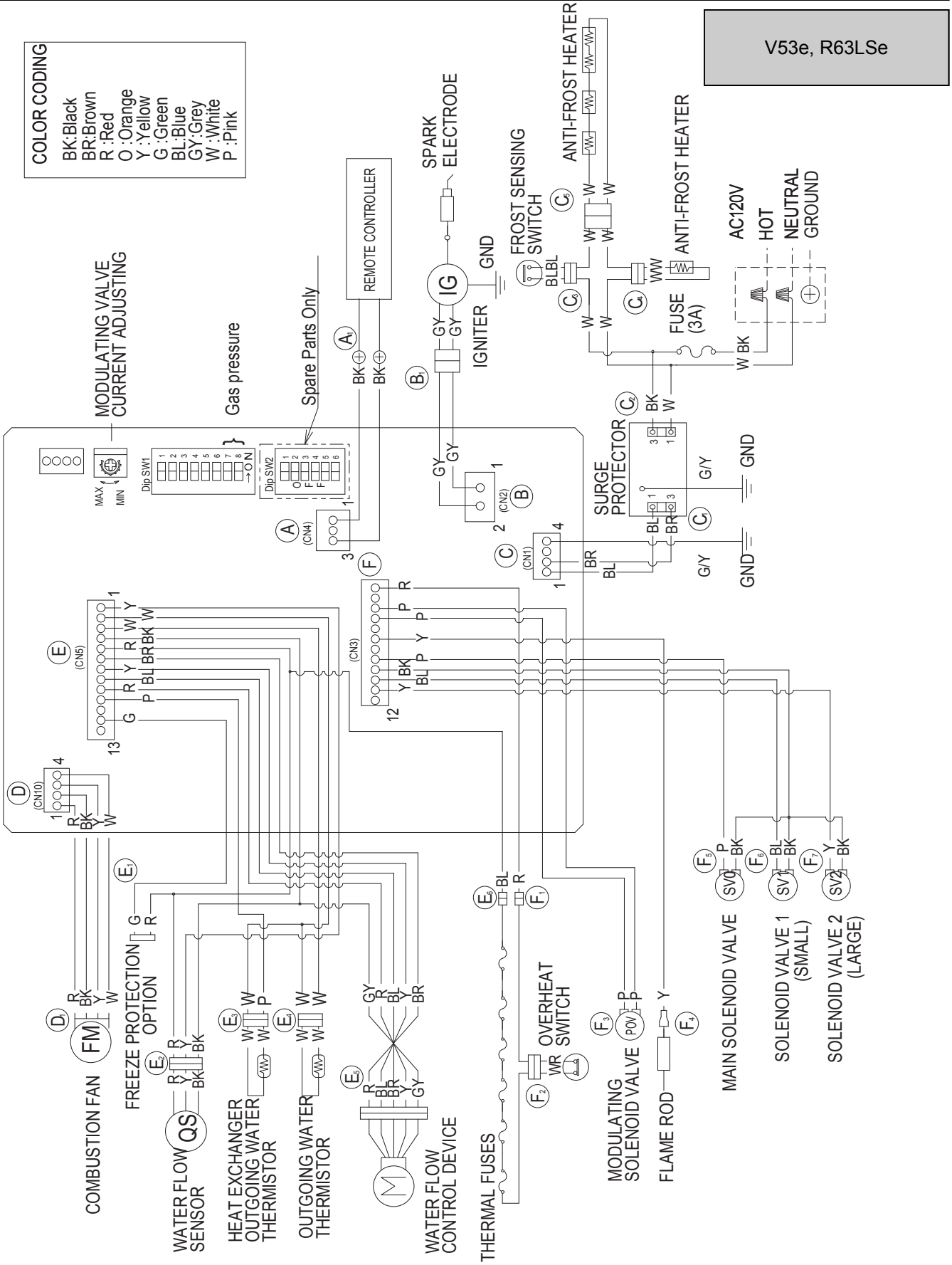
Wiring Diagram

R/C98i(ASME),
R/C98e(ASME)



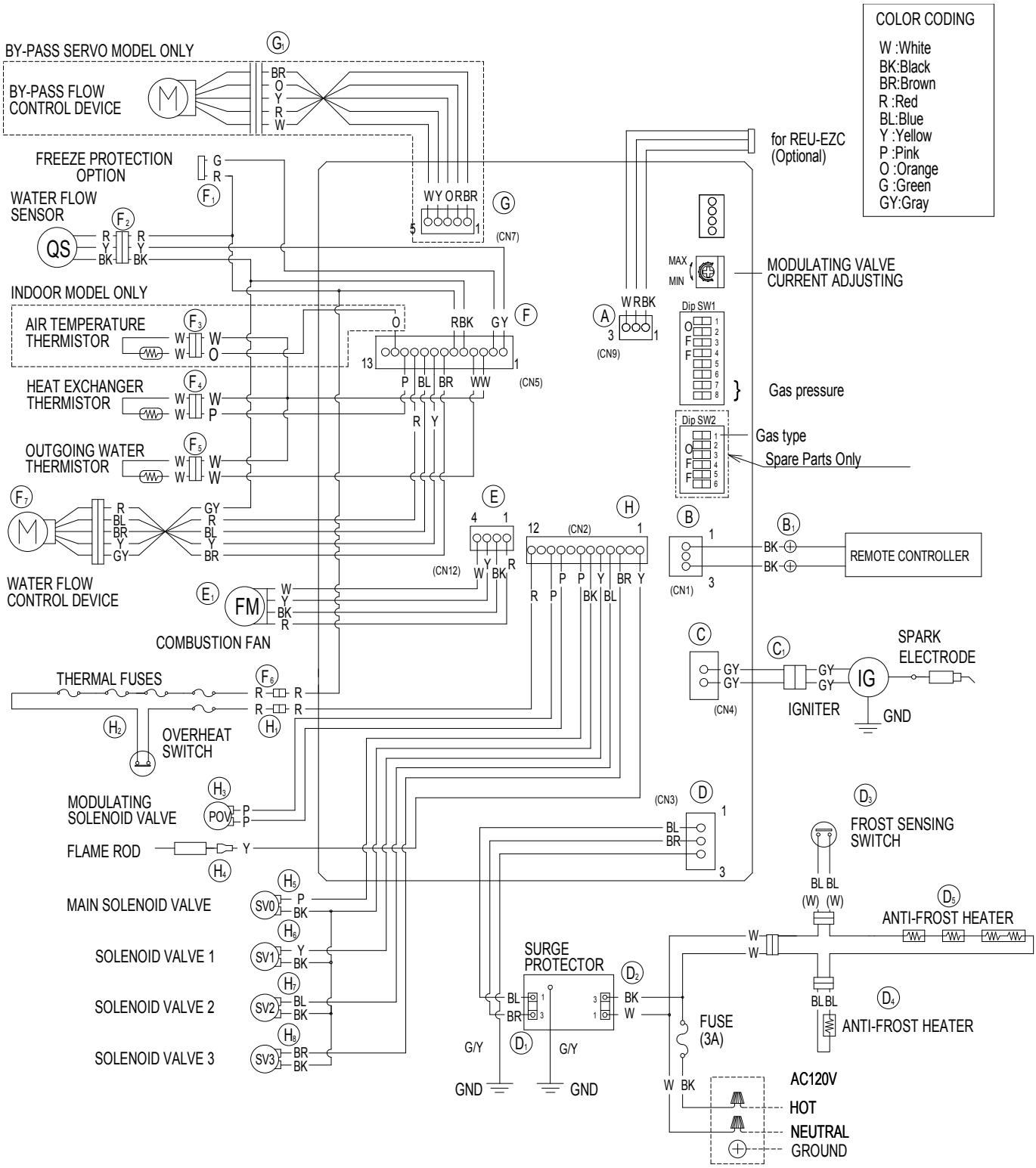
Wiring Diagram

V53e, R63LSe



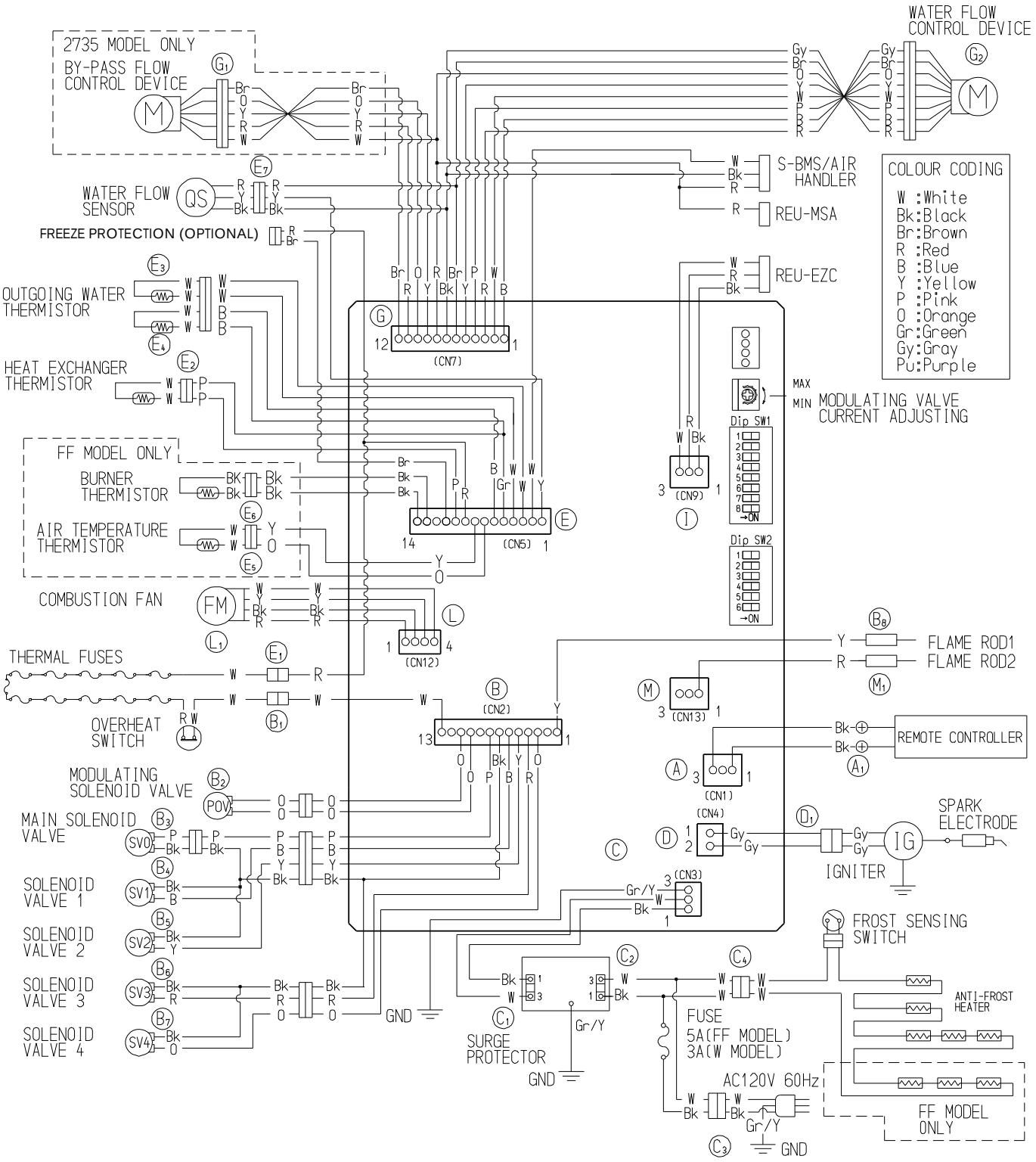
Wiring Diagram

R50LSi, R63LSe2, R75LSe-VA,
R75LSi-VA, R94LSe-VA, R94LSi-VA



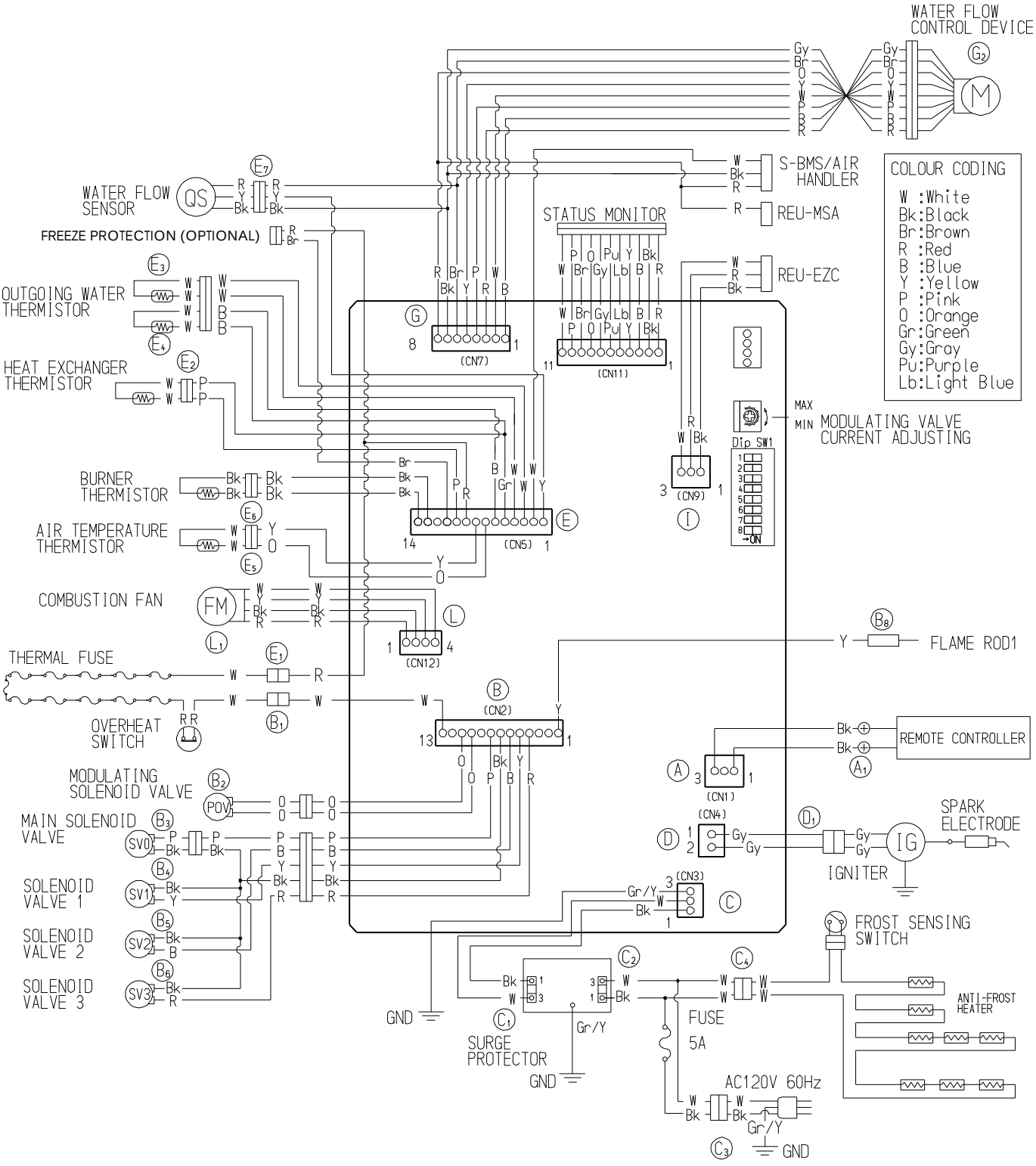
Wiring Diagram

R75LSe-VB, R75LSi-VB,
R94LSe-VB, R94LSi-VB



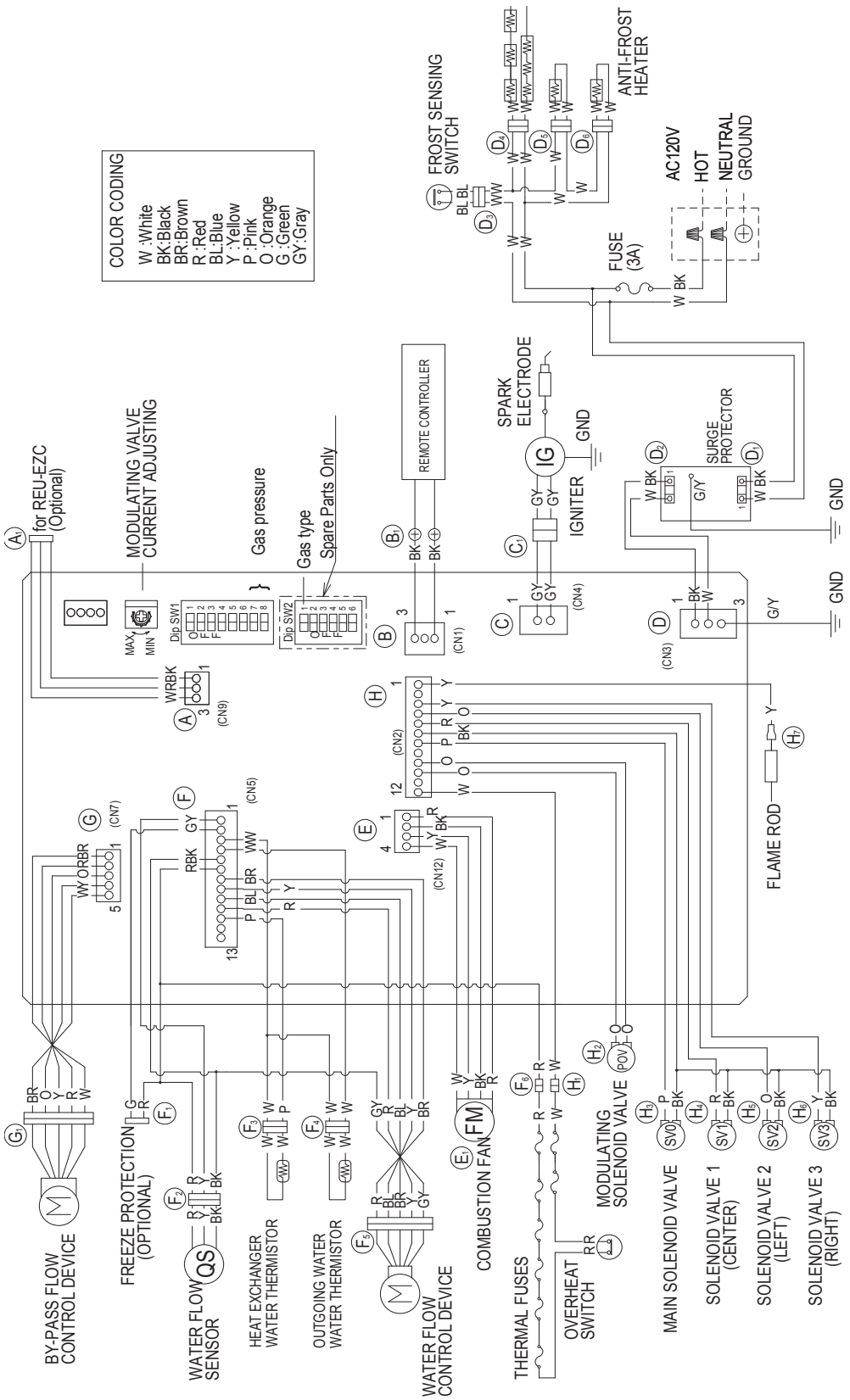
Wiring Diagram

V53i



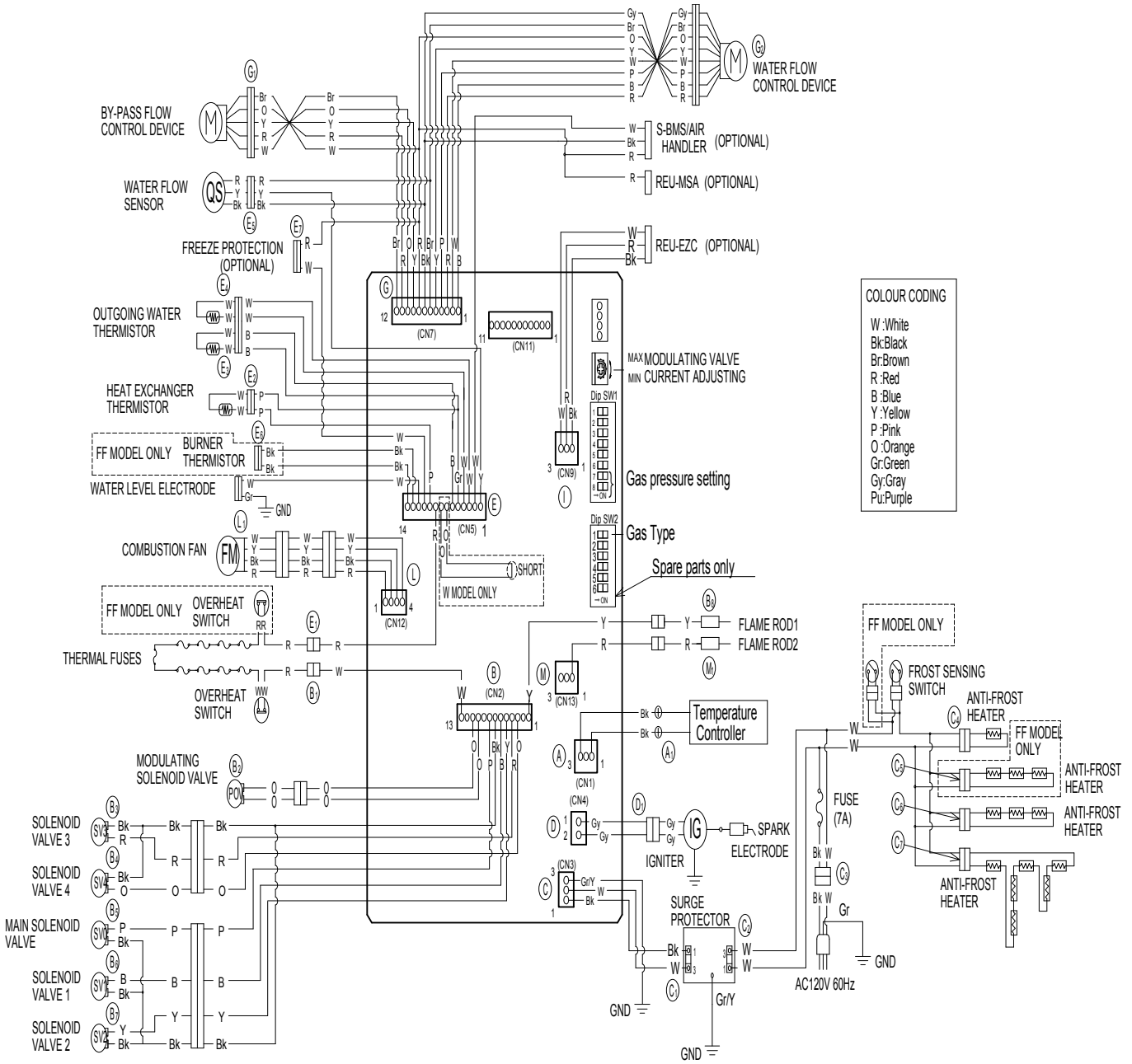
Wiring Diagram

R98LSe(ASME),
R98LSi(ASME)



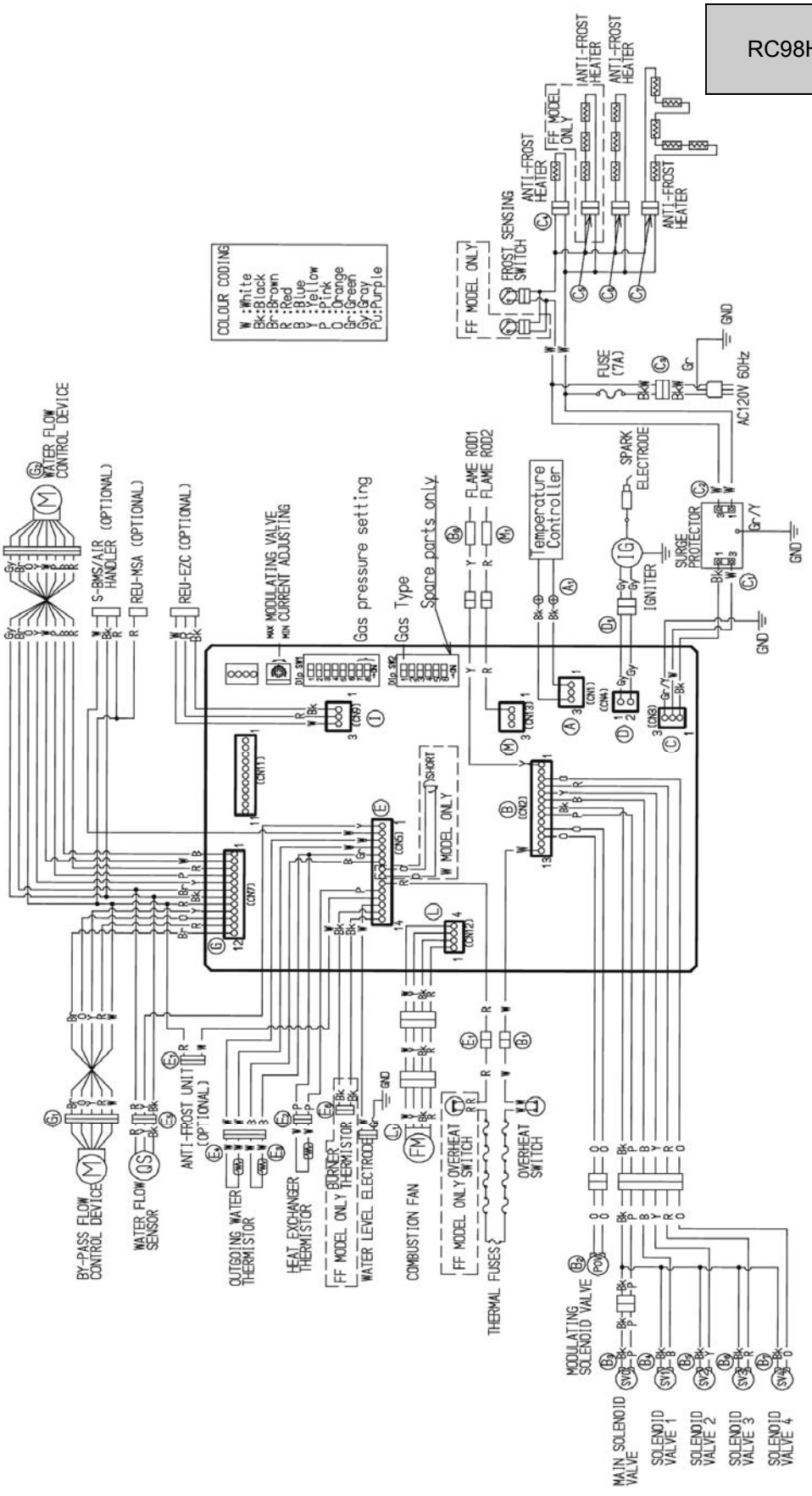
Wiring Diagram

RC80HPe, RC80HPi



Wiring Diagram

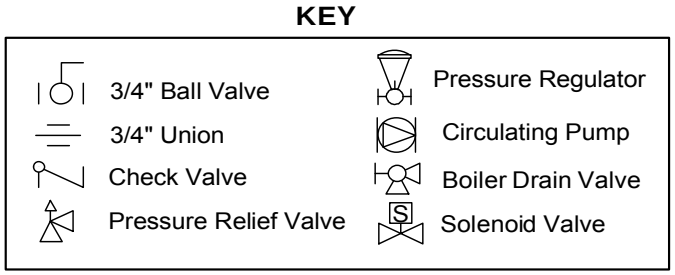
RC98HPe, RC98HPi

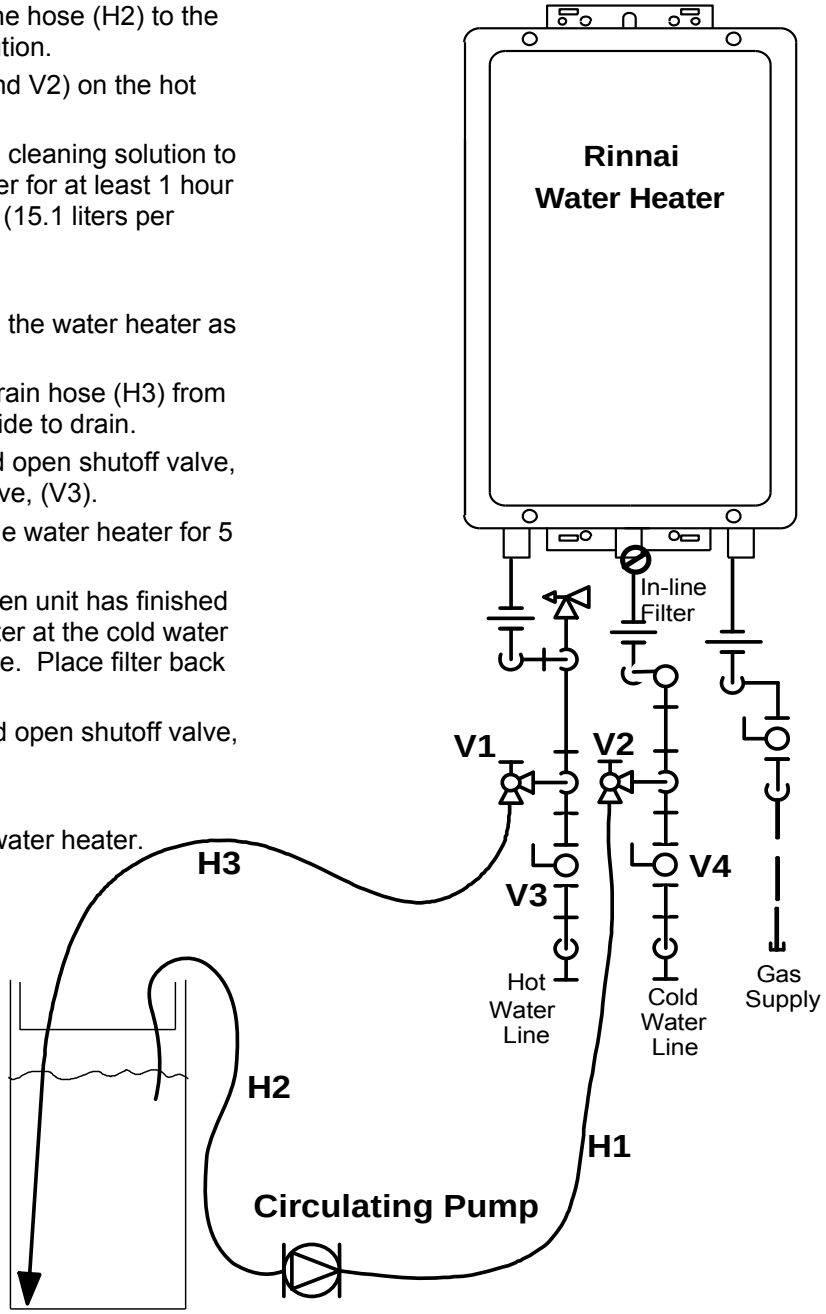


Flushing the Heat Exchanger

An “LC” or “00” error code indicates the unit is beginning to lime up and must be flushed. Failure to flush the appliance will cause damage to the heat exchanger. Damage caused by lime build-up is not covered by the unit’s warranty. After flushing, reset the LC fault code by turning off the power to the unit and turning the power back on.

1. Disconnect electrical power to the water heater.
2. Close the shutoff valves on both the hot water and cold water lines (V3 and V4).
3. Connect pump outlet hose (H1) to the cold water line at service valve (V2).
4. Connect drain hose (H3) to service valve (V1).
5. Pour 4 gallons of undiluted virgin, food grade, white vinegar into pail.
6. Place the drain hose (H3) and the hose (H2) to the pump inlet into the cleaning solution.
7. Open both service valves (V1 and V2) on the hot water and cold water lines.
8. Operate the pump and allow the cleaning solution to circulate through the water heater for at least 1 hour at a rate of 4 gallons per minute (15.1 liters per minute).
9. Turn off the pump.
10. Rinse the cleaning solution from the water heater as follows:
    a. Remove the free end of the drain hose (H3) from the pail. Place in sink or outside to drain.
    b. Close service valve, (V2), and open shutoff valve, (V4). Do not open shutoff valve, (V3).
    c. Allow water to flow through the water heater for 5 minutes.
    d. Close shutoff valve (V4). When unit has finished draining remove the in-line filter at the cold water inlet and clean out any residue. Place filter back into unit and open valve (V4).
    e. Close service valve, (V1), and open shutoff valve, (V3).
11. Disconnect all hoses.
13. Restore electrical power to the water heater.





Manual Draining of the Water Heater

⚠ WARNING To avoid burns, wait until the equipment cools down before draining the water. The water in the appliance will remain hot after it is turned off.

If the water heater is not going to be used during a period of possible freezing weather, it is recommended that the water inside the water heater be drained.

To manually drain the water:

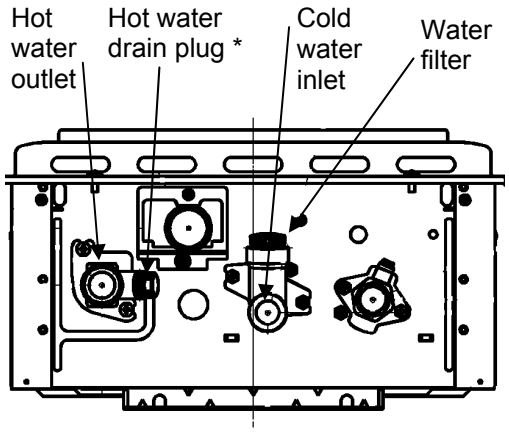
1. Shut off cold water supply, hot water valve and gas supply.
2. Turn off the temperature controller.
3. Disconnect the power to the water heater.
4. Remove the drain caps on both isolation valves and open both valves above the caps (blue and red valve handles). -OR- Open hot water drain plug at the hot water outlet.
5. Remove water filter to drain the cold water.
6. For condensing models unscrew the water drain plug from the drain line next to the hot water outlet and remove the condensate trap drain plug. Allow to drain.

To resume normal operation:

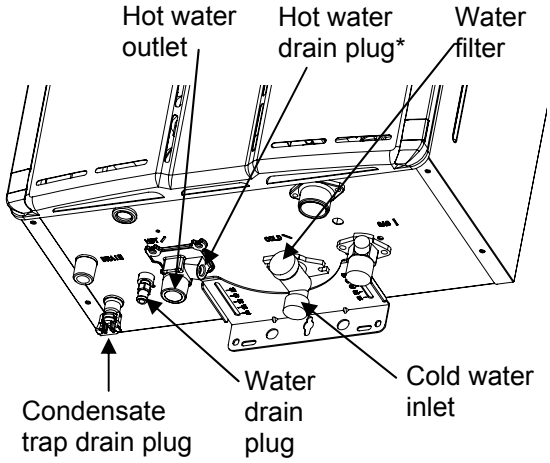
1. Confirm that all water drain plugs are removed, that the gas supply is turned off, and that all taps are closed.
2. For condensing models insert the condensate trap drain plug and screw in the water drain plug.
3. Screw in the water filter in the cold water inlet.
4. Replace the drain caps and close both isolation valves. -OR- Screw in the hot water drain plug.
5. Open the cold water supply and hot water valve.
6. Open a tap and confirm that water flows, and then close.
7. Turn on the power.
8. After confirming that the temperature controller is off, turn on the gas supply.
9. Turn on the temperature controller.

* Use a wrench or other tool to unscrew the hot water drain plug.

NON-CONDENSING



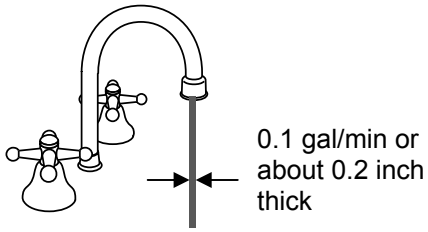
CONDENSING



Running a low volume of water through the water heater to prevent freezing

If the temperature exceeds the ability of the water heater to freeze protect itself, or if power is lost, the following steps may prevent the water heater and external piping from freezing. (Units connected with EZConnect™ should be drained to prevent freezing if not in use.)

1. Turn the water heater off.
2. Close the gas supply valve.
3. Turn on a hot water tap to flow water about 0.1 gal/min or where the stream is about 0.2 inches thick.



When the water heater or external piping has frozen

1. Do not operate the water heater if it or the external piping is frozen.
2. Close the gas and water valves and turn off the power.
3. Wait until the water thaws. Check by opening the water supply valve.
4. Check the water heater and the piping for leaks.

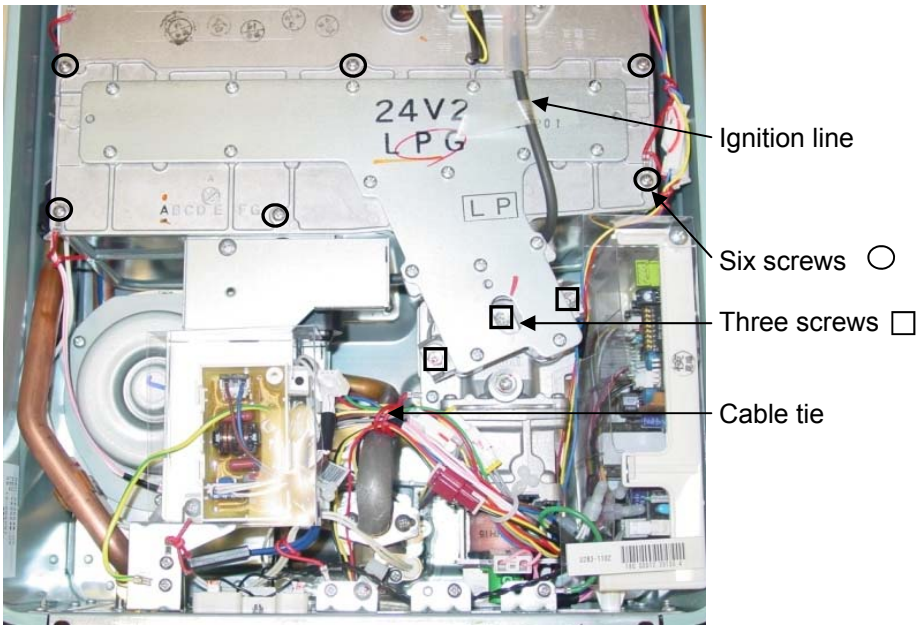
Component Replacement Instructions

Gas Control Assembly

R/C42e, R/C53e, V53e, R63LSe

1. Turn off the gas supply.
2. Turn off the 120 V power supply.
3. Remove four screws securing the front panel. Remove front panel.
4. Move aside the ignition line by pulling it out from the clear plastic tubing. (Figure 1)
5. Remove the six screws that attach the gas manifold to the combustion chamber (part of the heat exchanger assembly). (Figure 1)
6. Remove the three screws that attach the gas manifold to the gas valve. Pull out the gas manifold. (Figure 1)

Figure 1



7. Remove the screw on the gas valve holding the cable tie.
8. Remove the 3 screws attaching the gas connection to the underneath side of the water heater. (Figure 2)

Figure 2

9. Pull the gas connection down to disconnect it from the gas control assembly.
10. Pull out the gas control assembly. Remove the wire harness from the 4 solenoids.

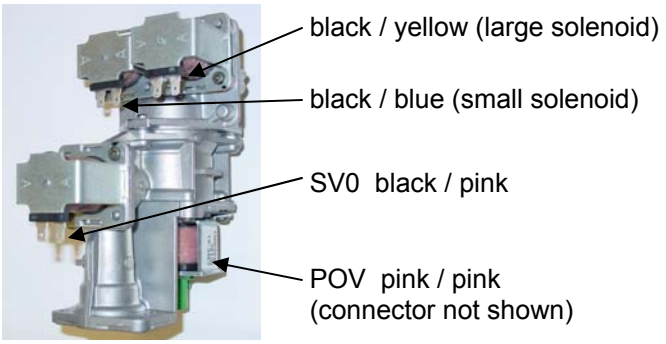
Gas Control Assembly

R/C42e, R/C53e, V53e, R63LSe

⚠ WARNING Failure to correctly assemble the components according to these instructions may result in a gas leak or explosion.

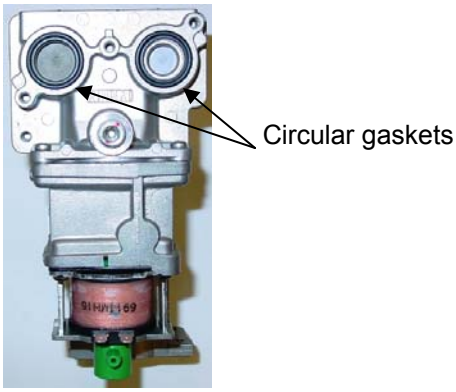
11. Install the gas valve and attach the wire harness to the 4 solenoids. (Figure 3)
12. Install the gas connection with 3 screws.

Figure 3



13. Replace the o-ring between the gas valve and the gas connection.
14. Replace the two circular gaskets (included in kit) in the gas valve. (Figure 4) Make sure that the ribbed side faces toward the manifold and that the flat side faces toward the gas valve.
15. Start the three screws that attach the gas manifold to the gas valve. Tighten the six screws that hold the gas manifold to the combustion chamber. Finish tightening the three screws that hold the gas manifold to the gas valve.
16. Attach ignition line.
17. Perform the Gas Pressure Setting Procedure.

Figure 4



Gas Control Assembly

R/C53i(PLUS), R70e, R/C85e(PLUS), R/C85i(PLUS), R50LSi, R63LSe2, V53i, R75LSe-VA, R75LSi-VA, R94LSe-VA, R94LSi-VA

1. Turn off the gas supply.
2. Turn off the 120 V power supply.
3. Remove four screws securing the front panel. Remove front panel.
4. Indoor models only: Remove the temperature controller and bracket by sliding up and out of the slots. On the V53i remove the status monitor from the bottom of the manifold (one screw).
5. Pull out wire harness connector at the gas manifold assembly. See Figure 1.
6. Move aside the ignition line by pulling it out from the clear plastic tubing.
7. Remove the six screws that attach the gas manifold to the combustion chamber (part of the heat exchanger assembly).
8. Remove the three screws that attach the gas manifold to the gas valve. Pull out the gas manifold.

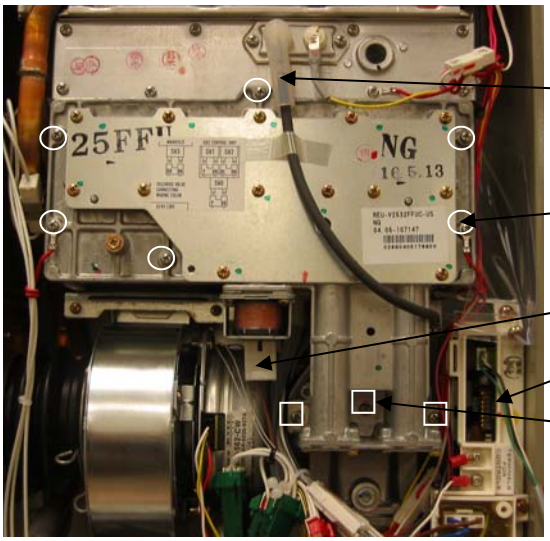


Figure 1

9. Remove the four screws attaching the gas connection to the underneath side of the water heater. Figure 2.

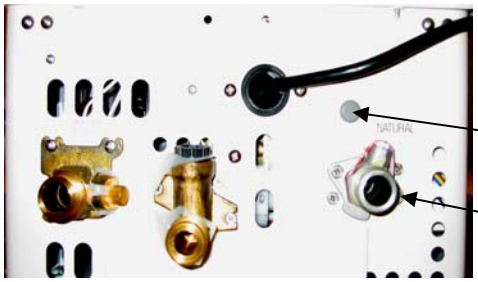


Figure 2

10. Pull the gas connection down to disconnect it from the gas control assembly.
11. Pull out the gas control assembly. Remove the wire harness from the 4 solenoids.

⚠ WARNING Failure to correctly assemble the components according to these instructions may result in a gas leak or explosion.

12. Replace the O-ring (included in kit) where the assembly attaches to the gas connection. Make sure the old O-ring is removed and discarded. Install the new gas control assembly.

Gas Control Assembly

R/C53i(PLUS), R70e, R/C85e(PLUS), R/C85i(PLUS), R50LSi, R63LSe2, V53i, R75LSe-VA, R75LSi-VA, R94LSe-VA, R94LSi-VA

12. Attach wire harness to the solenoids as shown in Figure 3 below.

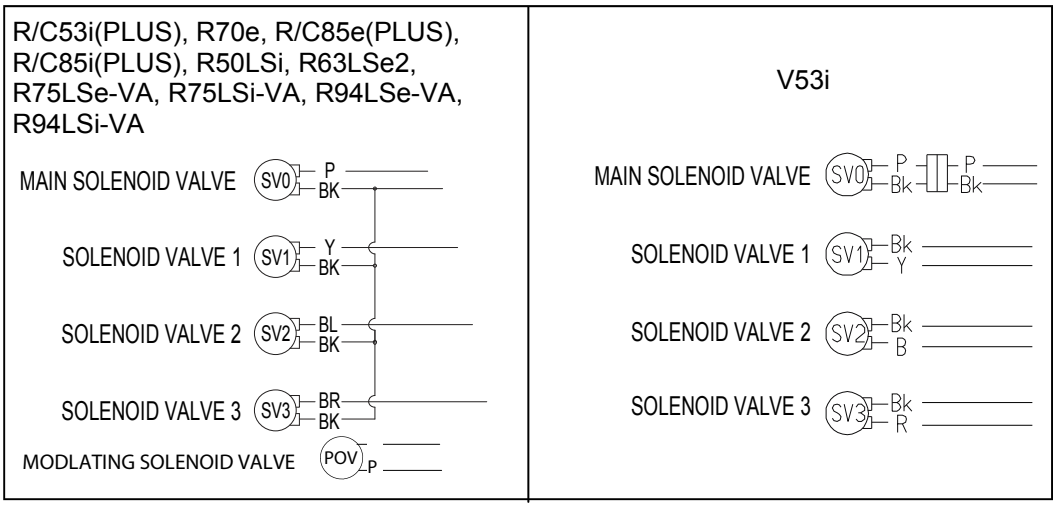

R/C53i(PLUS), R70e, R/C85e(PLUS), R/C85i(PLUS), R50LSi, R63LSe2, R75LSe-VA, R75LSi-VA, R94LSe-VA, R94LSi-VA
MAIN SOLENOID VALVE SV0 P BK
SOLENOID VALVE 1 SV1 Y BK
SOLENOID VALVE 2 SV2 BL BK
SOLENOID VALVE 3 SV3 BR BK
MODLATING SOLENOID VALVE POV P
V53i
MAIN SOLENOID VALVE SV0 P Bk P Bk
SOLENOID VALVE 1 SV1 Bk Y
SOLENOID VALVE 2 SV2 Bk B
SOLENOID VALVE 3 SV3 Bk R

Figure 3

13. Remove old packing from gas manifold. Install the gas manifold using 2 new packings (included in kit) between the manifold and the heat exchanger. (Figure 4).
14. Replace the two circular gaskets (included in kit) in the gas valve (Figure 5). Make sure that the ribbed side faces toward the manifold and that the flat side faces toward the gas valve.

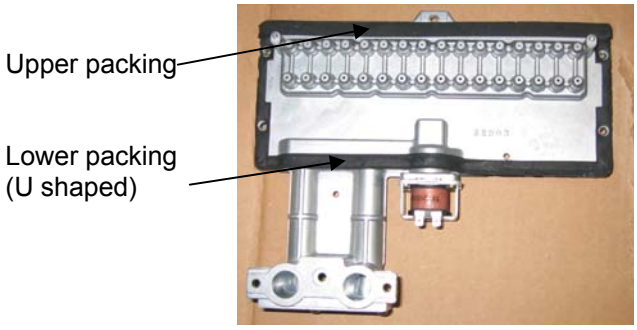


Figure 4

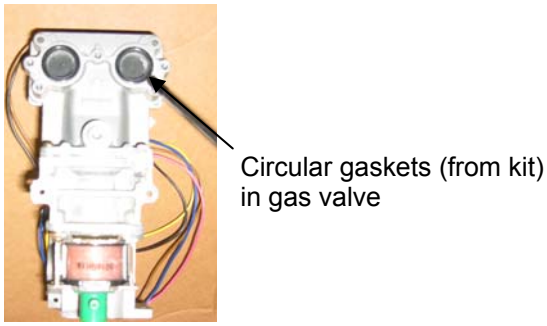


Figure 5

15. Start the three screws that attach the gas manifold to the gas valve. Tighten the six screws that hold the gas manifold to the combustion chamber. Finish tightening the three screws that hold the gas manifold to the gas valve.
16. Attach wiring harness connector (black & brown wires) to the gas manifold.
17. For indoor models only, install the temperature controller and bracket or for the V53i install the status monitor.
18. Attach ignition line.
19. Perform the Gas Pressure Setting Procedure.

Gas Control Assembly

R/C98e(ASME), R/C98i(ASME),
R98LSe(ASME), R98LSi(ASME)

1. Turn off the gas supply.
2. Turn off the 120 V power supply.
3. Remove four screws securing the front panel. Remove front panel.
4. On indoor models, remove the bracket holding the controller (1 screw). (Figure 1)
5. Move aside the ignition line by pulling it out from the clear plastic tubing. (Figure 2)
6. Disconnect 3 solenoid harnesses from the bottom of the manifold.
7. Remove the 5 screws that attach the gas manifold to the combustion chamber (part of the heat exchanger assembly). (Figure 2)
8. Remove the 2 screws that attach the gas manifold to the gas valve. These screws are machine screws and must be used at these locations. (Figure 2)
9. Pull out the gas manifold and remove the connector at the ignitor at the left side of the gas manifold.
10. Remove the 3 screws attaching the gas connection to the under side of the water heater. (Figure 3)
11. Remove the screw attaching the gas valve to the rear of the case. (Figure 2)
12. Pull the gas connection down to disconnect it from the gas control assembly.

Bracket screw

Figure 1

(indoor models)

5 screws ○
(gas manifold)

2 machine screws □
(gas valve)

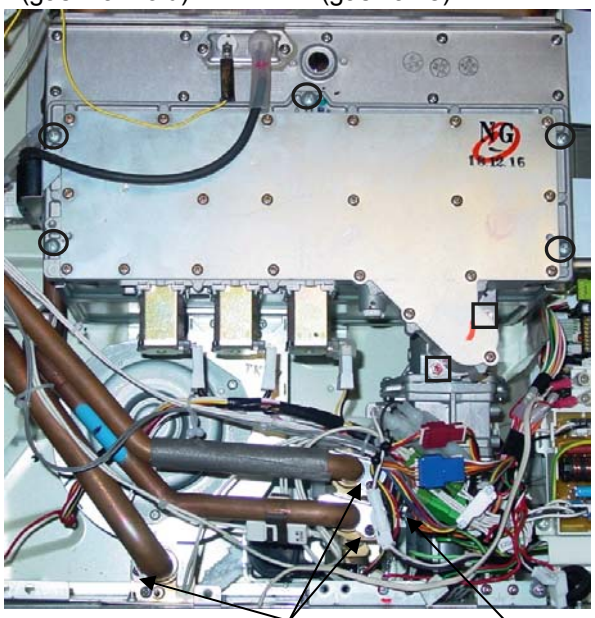


Figure 2

Water line connections

Screw (gas valve, step 11)

Regulator screw access

Gas connection attached with 3 screws

Figure 3

Gas Control Assembly

R/C98e(ASME), R/C98i(ASME),
R98LSe(ASME), R98LSi(ASME)

⚠ WARNING Failure to correctly assemble the components according to these instructions may result in a gas leak or explosion.

13. Pull out the gas control assembly. Remove the wire harness from the 2 solenoids.
14. Remove old o-ring from gas connection and install new o-ring from kit.
15. Install the gas valve and attach the wire harness to the 2 solenoids. (Figure 4)

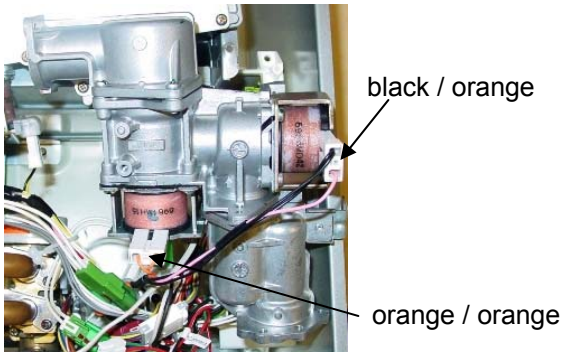


Figure 4

16. Install the gas connection with 3 screws.
17. Replace the circular gasket (included in kit) in the gas valve. (Figure 5) Make sure that the ribbed side faces toward the manifold and that the flat side faces toward the gas valve.
18. Reconnect gray/gray harness to ignitor module before installing manifold.
19. Remove old packing from manifold and install new packing.
20. Start the 2 screws that attach the gas manifold to the gas valve. Tighten the 5 screws that hold the gas manifold to the combustion chamber. Finish tightening the 2 screws that hold the gas manifold to the gas valve.
21. Install screw attaching the gas valve to the back of the cabinet.
22. Install he 3 solenoid valve harness to the manifold.
23. Attach ignition line.
24. On indoor models, install the bracket with the controller.
25. Perform the Gas Pressure Setting Procedure.

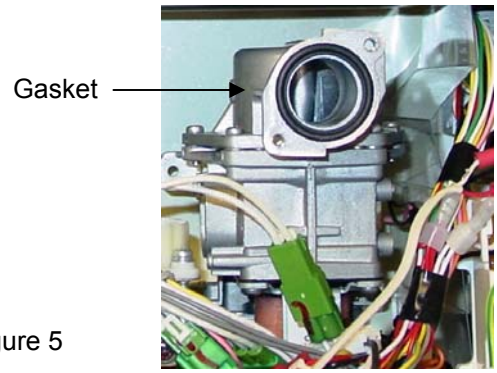


Figure 5

Gas Control Assembly

RC80HPi, RC80HPe,
R75LSe-VB, R75LSi-VB, R94LSe-VB, R94LSi-VB

1. Turn off gas supply.
2. Turn off water supply.
3. Turn off 120v power supply.
4. Remove four screws securing the front panel. Remove front panel.

Remove controller assembly (indoor model only)

5. RC80HPi: Remove temperature controller. Remove two screws for temperature controller bracket. Remove bracket.
   VB Models: Slide controller bracket up and out of the slots on the cabinet.

Remove gas manifold and gas valve

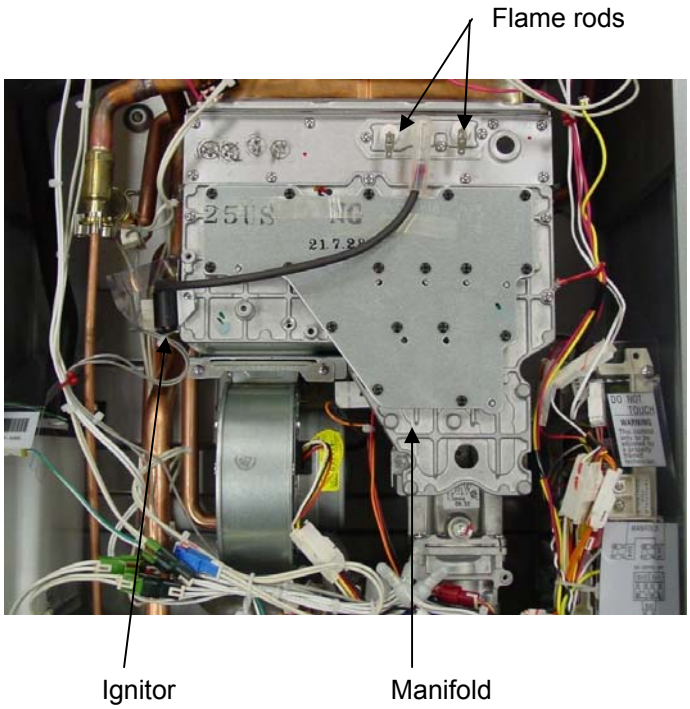
6. Disconnect high tension cord from ignitor.
7. Disconnect flame rod wires. (yellow and red)
8. Remove six pan head screws from manifold (six screws outer edge) and three machine screws, at bottom of manifold, to gas valve.
9. Disconnect ignitor module harness, mounted on manifold. (gray/gray)
10. Disconnect the two solenoid wire harnesses at bottom of manifold. Remove manifold plate.
11. Remove the four screws attaching the gas connection to the bottom side of water heater.
12. Pull the gas connection down to disconnect it from the gas control assembly.
13. Pull out the gas control assembly. Remove the three solenoid wire harnesses.

⚠ WARNING

Failure to correctly assemble the components according to these instructions may result in a gas leak or explosion.

Install gas valve and gas manifold

14. Install the gas control assembly and connect the wire harness to the three solenoids.
15. Discard o-ring from gas connection. Install new o-ring from kit. Install the gas connection with four screws.
16. Replace the circular gaskets (included in kit) in the gas valve. Ensure that the ribbed side faces outward.



17. Remove old packing from gas manifold. Install new packing from kit to the manifold plate.
18. Reconnect two solenoid wire harnesses to manifold.
19. Reconnect ignitor module harness.
20. Start the three screws that attach the gas manifold to the gas valve. Install and tighten the six screws that hold the gas manifold to the combustion chamber. Tighten the three screws that hold the gas manifold to the gas valve.
21. Reconnect high tension cord to ignitor.
22. Reconnect flame rod wires. (yellow and red)

Install temperature controller assembly (indoor model only)

23. RC80HPi: Install temperature controller bracket with two screws. Install temperature controller.
    VB Models: Slide controller bracket into the slots on the cabinet.

Testing and close up

24. After calibrating the low and high gas pressure settings, install the front panel using four screws.

Gas Control Assembly

RC98HPi, RC98HPe

1. Turn off gas supply.
2. Turn off water supply.
3. Turn off 120v power supply.
4. Remove four screws securing the front panel. Remove front panel.

Remove controller assembly (indoor model only)

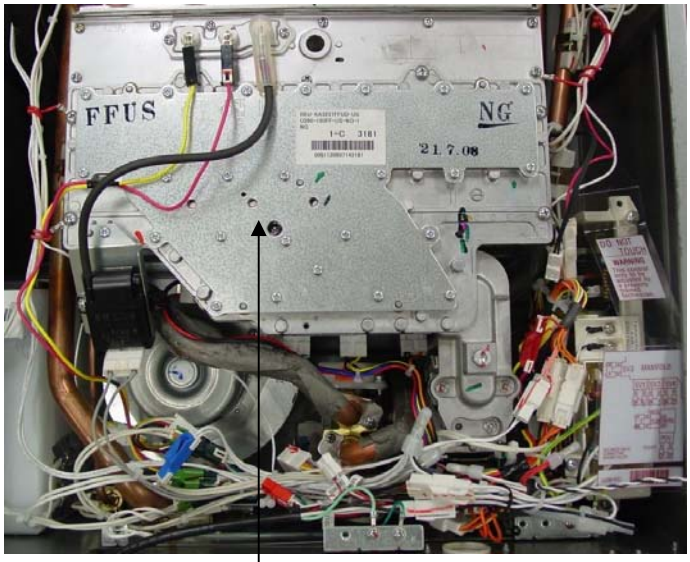
5. Remove temperature controller. Remove two screws for temperature controller bracket. Remove bracket.

Remove gas manifold and gas valve

6. Disconnect high tension cord from electrode. Remove one screw for electrode bracket. Remove bracket from manifold.
7. Disconnect flame rod wires. (yellow and red)
8. Remove seven pan head screws from manifold (six screws outer edge, one screw in middle) and three machine screws, at bottom of manifold, to gas valve.
9. Disconnect the four solenoid wire harnesses at bottom of manifold. Remove manifold plate.
10. Remove the three screws attaching the gas connection to the bottom side of water heater.
11. Pull the gas connection down to disconnect it from the gas control assembly.
12. Pull out the gas control assembly. Remove the two solenoid wire harnesses.

Install gas valve and gas manifold

13. Install the gas control assembly and connect the wire harness to the two solenoids.
14. Install the gas connection with three screws.
15. Replace the circular gasket (included in kit) in the gas valve. Ensure that the ribbed side faces outward.
16. Remove packing from manifold. Install new packing from kit to the gas manifold.
17. Start the three screws that attach the gas manifold to the gas valve. Install and tighten the seven screws that hold the gas manifold to the combustion chamber. Tighten the three screws that hold the gas manifold to the gas valve.



Manifold

18. Connect the four solenoid wire harnesses at the bottom of the manifold. Install electrode bracket with one screw to gas manifold. Connect high tension cord to electrode.

Install temperature controller assembly (indoor model only)

19. Install temperature controller bracket with two screws. Install temperature controller.

Testing and close up

20. After calibrating the low and high gas pressure settings (see next page), install the front panel using four screws.

Fan

R/C42e, R/C53e, V53e, R63LSe

1. Turn off the gas supply.
2. Turn off the 120 V power supply.
3. Turn off the water supply.
4. Remove four screws securing the front panel. Remove front panel.
5. On the V53e and R63LSe, remove the screws (3) holding the bracket with the surge protector. (Figure 1)
6. Disconnect the wire harness at the fan assembly. (Figure 2)
7. On the V53e and R63LSe, remove the screw attaching the bracket with the ignitor to the bottom of the burner case. (Figure 2)
8. Remove the three screws attaching the fan sub -assembly to the fan casing. (Figure 3)
9. Pull out the fan sub-assembly.
10. Install the new fan sub-assembly and tighten with three screws.
11. On the V53e and R63LSe, install the bracket with the ignitor with one screw.
12. Attach the wire harness to the fan assembly (white, yellow, black, red wires).
13. On the V53e and R63LSe, install the bracket with the surge protector with three screws.
14. Install front panel using 4 screws.
15. Turn on water supply, power supply, and gas supply.

Figure 1

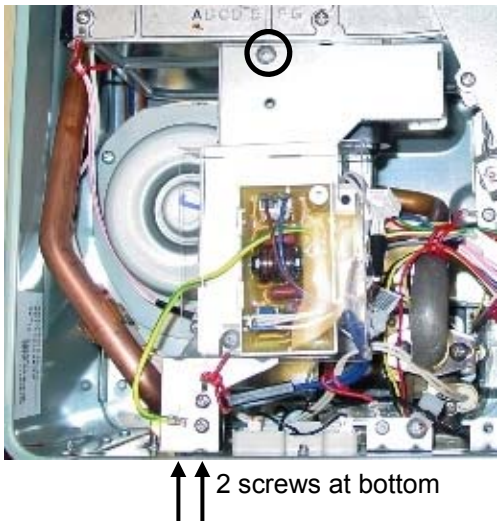


Figure 2

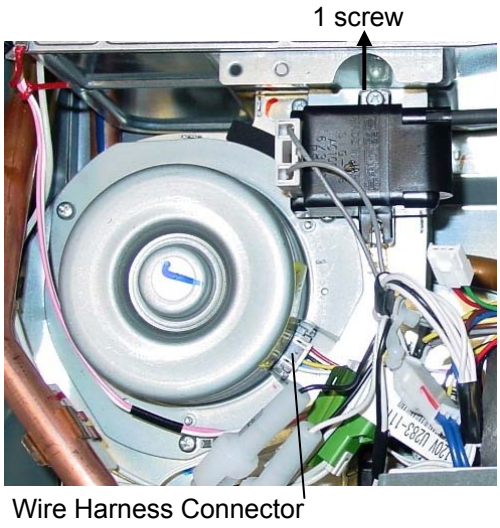
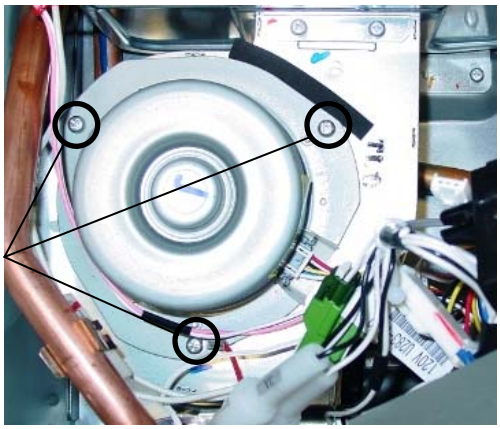


Figure 3



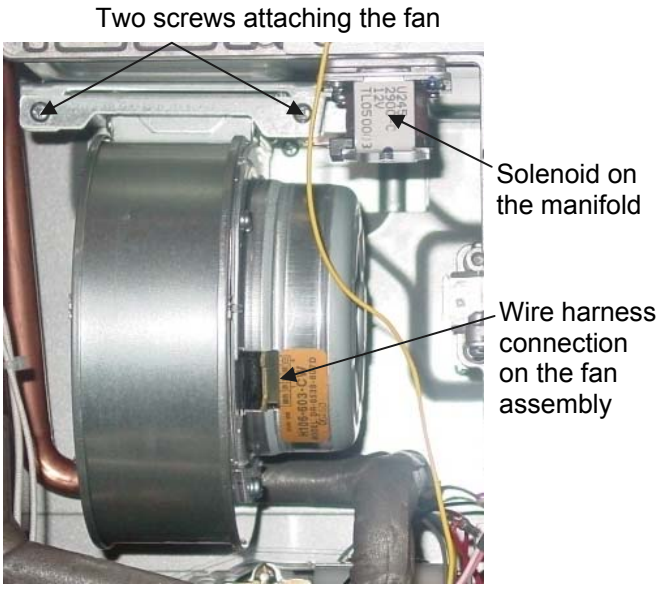
Component Replacement Instructions

Fan

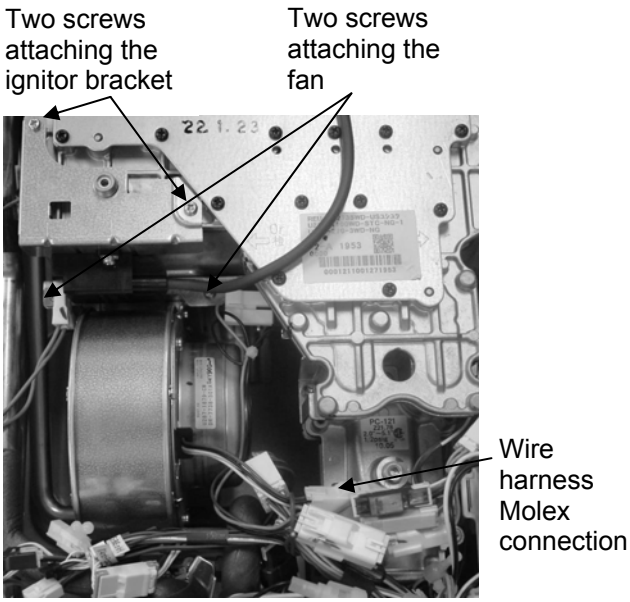
R70e, R/C85e(PLUS), R63LSe2, R75LSe, R94LSe

1. Turn off the gas supply.
2. Turn off the 120 V power supply. (The fan may be damaged if it is removed with power still applied.)
3. Turn off the water supply.
4. For VB models, remove the screw covers by pressing them down and sliding them off horizontally.
5. Remove four screws securing the front panel. Remove front panel.
6. For V and VA models, disconnect wire harness at the fan assembly. For VB models disconnect wire harness at the Molex connector.
7. For V and VA models, pull out the harness attached to the solenoid on the manifold to make room to pull out the fan assembly.
8. Remove the two screws that attach the fan assembly to the bottom of the burner.
9. Pull out the fan assembly.
10. Install the fan assembly by inserting the tab on the fan assembly into the slot at the base of the heat exchanger and attaching with two screws.
11. For V and VA models, attach the wire harness to the solenoid on the gas manifold (brown, black wires).
12. Attach the wire harness to the fan assembly (white, yellow, black, red wires).
13. Install front panel using 4 screws. For VB models, slide on screw covers.
14. Turn on water supply, power supply, and gas supply.

V and VA Models



VB Models

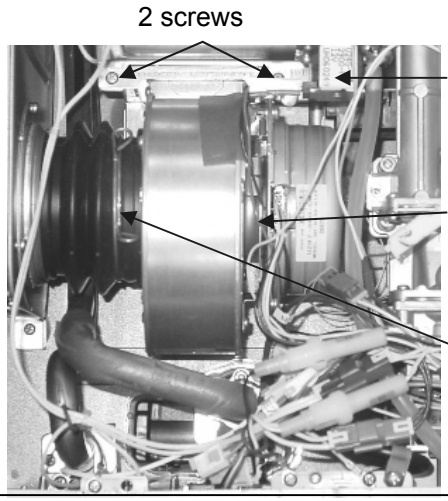


Fan

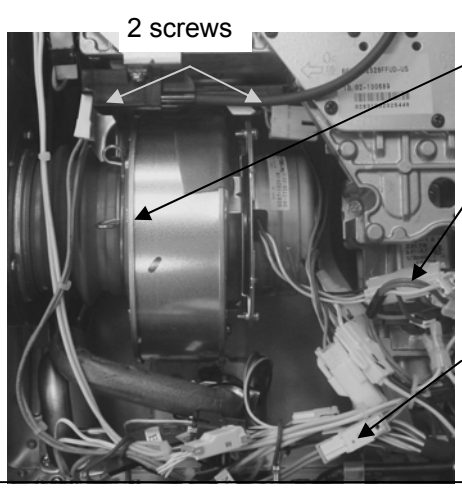
R/C53i(PLUS), R/C85i(PLUS), R50LSi, V53i, R75LSi, R94LSi

1. Turn off the gas supply.
2. Turn off the 120 V power supply. (The fan may be damaged if it is removed with power still applied.)
3. Turn off the water supply.
4. For VB models, remove the screw covers by pressing them down and sliding them off horizontally.
5. Remove four screws securing the front panel. Remove front panel.
6. For VB models, remove the controller bracket.
7. For V and VA models, disconnect wire harness at the fan assembly. For VB models disconnect wire harness at the Molex connector.
8. For V and VA models, pull out the harness attached to the solenoid on the manifold to make room to pull out the fan assembly.
9. Remove the air temperature thermistor (two white wires) at the connection with the (white and orange wires on VA models) / (white and yellow wires on VB models) within the wire bundle.
10. Loosen the ducting from the fan assembly by pinching open the metal clamp.
11. Remove the two screws that attach the fan assembly to the bottom of the burner.
12. Pull out the fan assembly.
13. Install the fan assembly by inserting the tab on the fan assembly into the slot at the base of the heat exchanger and attaching with two screws.
14. Push ducting over fan assembly inlet and secure with metal clamp.
15. For V and VA models, attach the wire harness to the solenoid on the gas manifold (brown, black wires).
16. Attach the wire harness to the fan assembly (white, yellow, black, red wires).
17. Attach the air temperature thermistor (O/W on VA models; O/Y on VB models).
18. For VB models, install the controller bracket.
19. Install front panel using 4 screws. For VB models, slide on screw covers.
20. Turn on water supply, power supply, and gas supply.

V and VA Models



VB Models



Fan

R/C98e(ASME), R/C98i(ASME),
R98LSe(ASME), R98LSi(ASME)

1. Turn off the gas supply.
2. Turn off the 120 V power supply.
3. Turn off the water supply.
4. Remove four screws securing the front panel. Remove front panel.
5. On indoor models, remove the bracket holding the controller (1 screw). (Figure 1)
6. Disconnect the wire harness at the fan assembly. (Figure 2)
7. Remove the three screws attaching the fan motor to the fan casing. (Figure 2)
8. Pull out the fan motor.
9. Install the new fan motor and tighten with three screws.
10. Attach the wire harness to the fan assembly (white, yellow, black, red wires).
11. On indoor models, install the bracket with the remote controller.
12. Install front panel using 4 screws.
13. Turn on water supply, power supply, and gas supply.

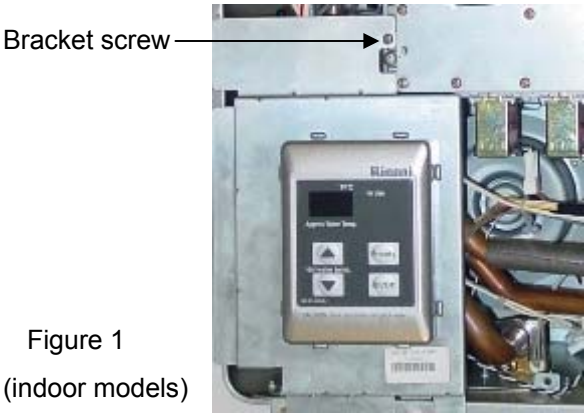


Figure 1

(indoor models)

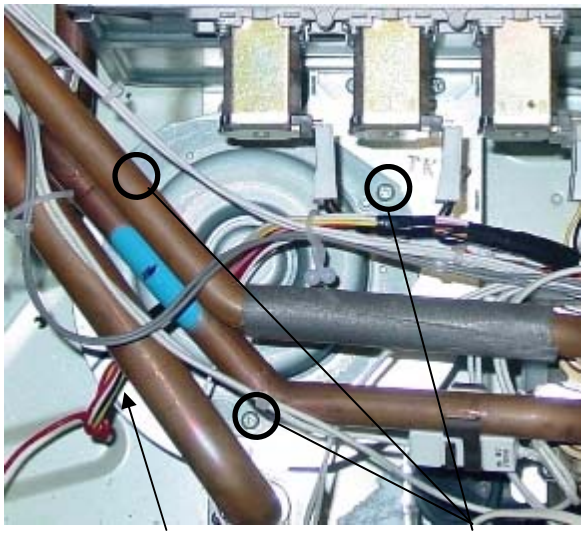


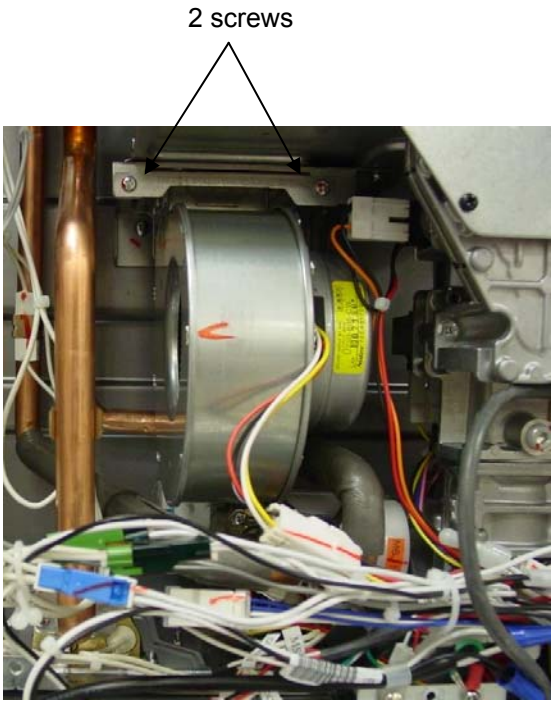
Figure 2

Component Replacement Instructions

Fan

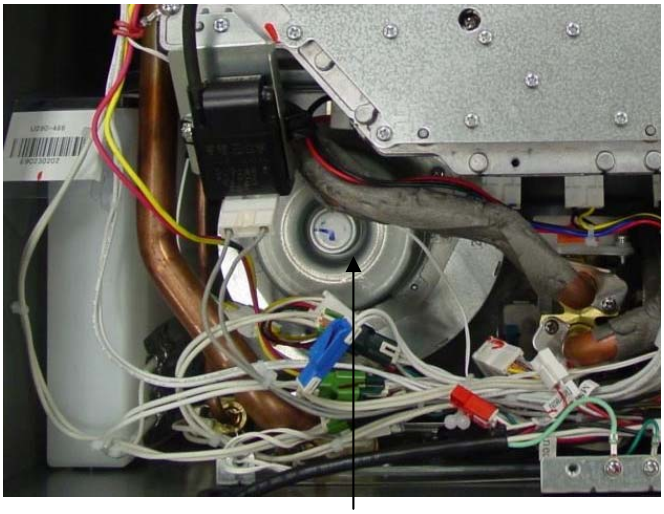
RC80HPe, RC80HPi

1. Turn off gas supply.
2. Turn off water supply.
3. Turn off 120v power supply.
4. **(Indoor model only)** Remove temperature controller. Remove two screws for temperature controller bracket. Remove bracket.
5. Disconnect fan harness connector (white, yellow, black, red).
6. Remove two screws at top of fan assembly.
7. Remove fan assembly.
8. Install new fan assembly.
9. Reinstall two screws at top of fan assembly.
10. Reconnect fan harness connector (white, yellow, black, red).
11. **(Indoor model only)** Reinstall temperature controller bracket with two screws. Install temperature controller in bracket.
12. Turn on 120v power. Turn on water supply. Turn on gas supply.



RC98HPe, RC98HPi

1. Turn off gas supply.
2. Turn off water supply.
3. Turn off 120v power supply.
4. **(Indoor model only)** Remove temperature controller. Remove two screws for temperature controller bracket. Remove bracket.
5. Disconnect high tension cord from electrode. Remove one screw for electrode module bracket. Remove electrode bracket from gas manifold.
6. Disconnect fan harness connector (white, yellow, black red).
7. Remove three screws and lock washers to fan motor.
8. Remove fan motor from housing between the copper pipes.
9. Install fan motor. Ensure fan motor is clocked correctly for harness connector.
10. Reinstall three screws and lock washers to fan motor.
11. Reinstall electrode module bracket to gas manifold with one screw. Install high tension cord to electrode.
12. **(Indoor model only)** Reinstall temperature controller bracket with two screws. Install temperature controller in bracket.
13. Turn on 120v power. Turn on water supply. Turn on gas supply.



PC Board

R/C42e, R/C53e

1. Turn off the gas supply.
2. Turn off the 120 V power supply.
3. Turn off the water supply.
4. Remove four screws securing the front panel. Remove front panel.
5. Lift up the plastic guard covering the front of the PC board.
6. Remove the controller connections.
7. Remove the screws securing the grounding cables.
8. If a surge protector with terminals is installed, then remove this board by removing two screws. This board should be re-installed on the replacement PC board.
9. Remove the two screws at the top and bottom of the PC board.
10. Pull out the PC board, remove plastic cover, and remove the connections.
11. Adjust dip switches on the new PC board.

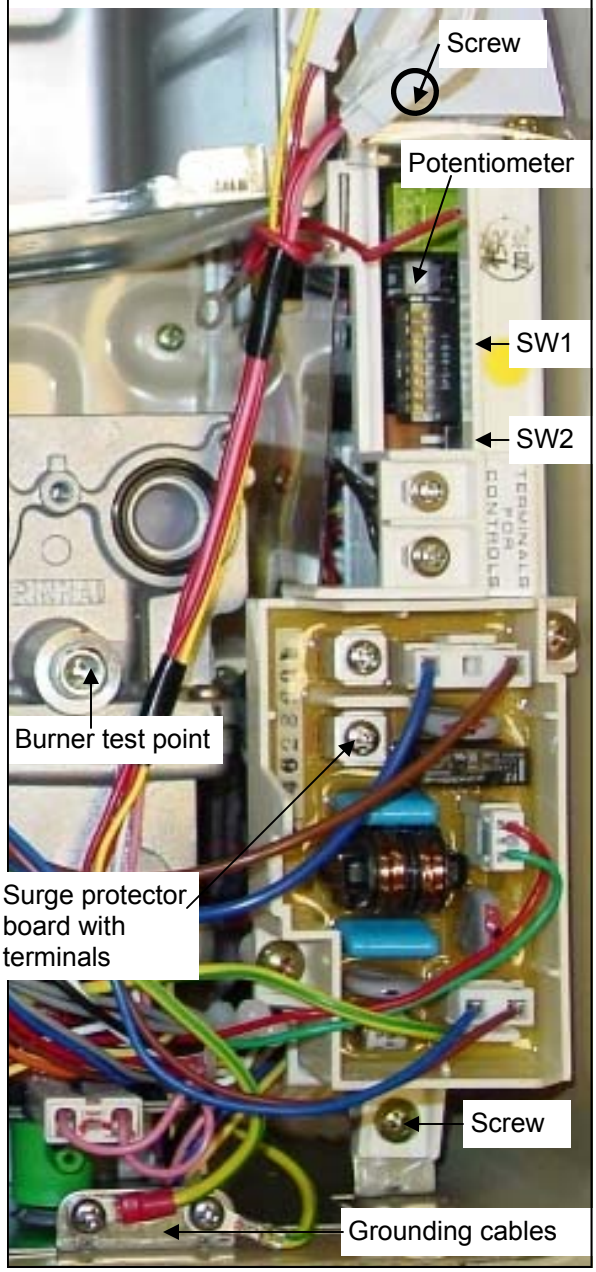
    Switches 1-8 (SW1): Configure the dip switches the same as on the original PC board. If necessary, refer to the Dip Switch section or to the Operation and Installation Manual for more information on these dip switches.

    Switches 1-4 (SW2): Configure according to the table.

SW2 setup

1	OFF - Propane Gas ON - Natural Gas
2	OFF position for models prior to these serial numbers: (on these units, the front panel does not have an “R” or “C” trade name, unless the front panel has been replaced) V1616W, V1616WC 06.02-000001 V2020W, V2020WC 05.07-000001 V2532W, V2532WC 05.05-117257 V2532FFU, V2532FFUC 05.05-117257 V2520FFU, V2520FFUC 05.05-109539 V2526W 05.05-110434 ON position for other models, serial numbers
3	OFF position
4	OFF - Residential Models ON - Commercial Models

Figure 1



12. Attach connections and plastic cover.
13. Insert PC board and attach with two screws.
14. Attach the grounding cables with screws.
15. Attach connections for the controller.
16. Perform the Gas Pressure Setting Procedure.

PC Board

V53e, R63LSe

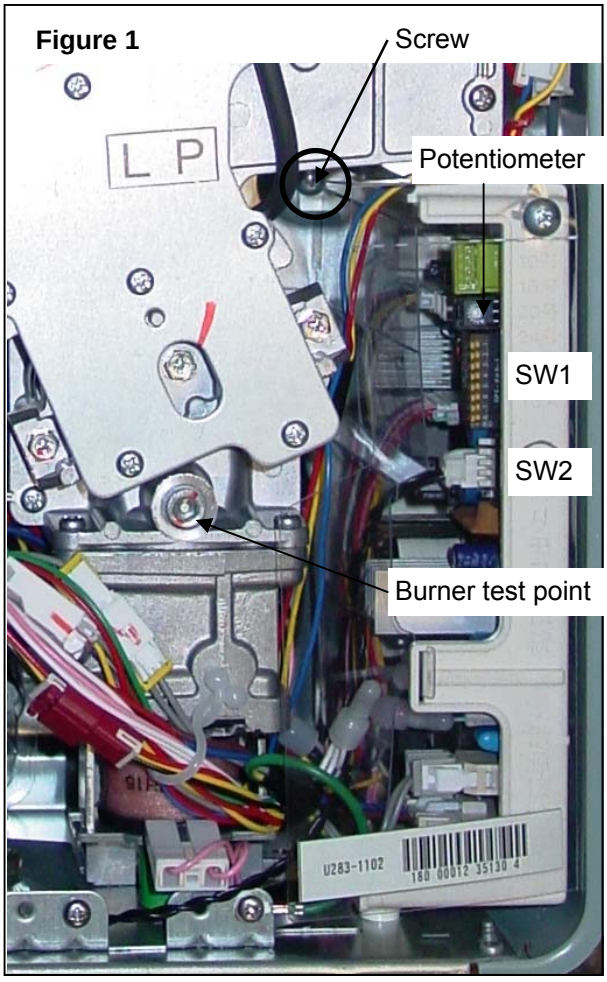
1. Turn off the gas supply.
2. Turn off the 120 V power supply.
3. Turn off the water supply.
4. Remove four screws securing the front panel. Remove front panel.
5. Remove the screw connecting the PC board to the back of the water heater casing.
6. Remove the ground wire at the bottom of the cabinet.
7. Pull out the PC board and remove the connections.
8. Adjust dip switches on the new PC board. Replacement PC boards have an additional bank of 6 dip switches. Adjust as follows:

   Switches 1-8 (SW1): Configure the dip switches the same as on the original PC board. If necessary, refer to the Dip Switch section or to the Operation and Installation Manual for more information on these dip switches.

   Switches 1-6 (SW2): Configure according to the diagrams below based on your model and gas type.

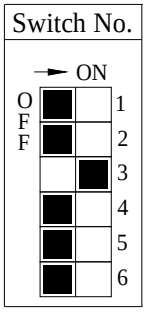
9. Attach connections and insert PC board. Insert the tab on the PC board into the hole in the bottom of the case. Attach with one screw.
10. Perform the Gas Pressure Setting Procedure.

Figure 1

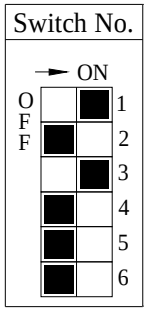


SW2 setup for V53e

Propane (LPG)

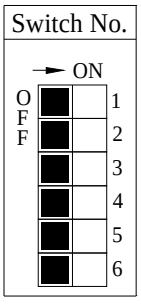


Natural Gas (NG)

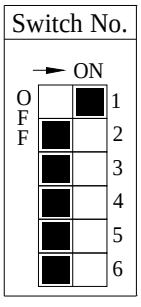


SW2 setup for R63LSe

Propane (LPG)



Natural Gas (NG)



PC Board

R/C53i(PLUS), R70e, R/C85e(PLUS), R/C85i(PLUS), R50LSi, R63LSe2, V53i, R75LSe, R75LSi, R94LSe, R94LSi, RC80HPe, RC80HPi, RC98HPe, RC98HPi

1. Turn off the gas supply.
2. Turn off the 120 V power supply.
3. Turn off the water supply.
4. Remove four screws securing the front panel. Remove front panel.
5. Lift up the plastic guard covering the front of the PC board.
6. Remove the controller connections and the two ground wires at the bottom of the cabinet.
7. If a surge protector with terminals is installed, then remove this board by removing two screws. This board should be re-installed on the replacement PC board.
8. Remove the two screws at the top and bottom of the PC board.
9. Pull out the PC board, remove plastic cover, and remove the connections.
10. Adjust dip switches on the new PC board.

    Switches 1-8 (SW1): Configure the dip switches the same as on the original PC board. If necessary, refer to the Dip Switch section or to the Operation and Installation Manual for more information on these dip switches.

    V Series (R70e, R/C85e, R/C53i, R/C85i)

    Switches 1-4 (SW2): Configure according to the table.

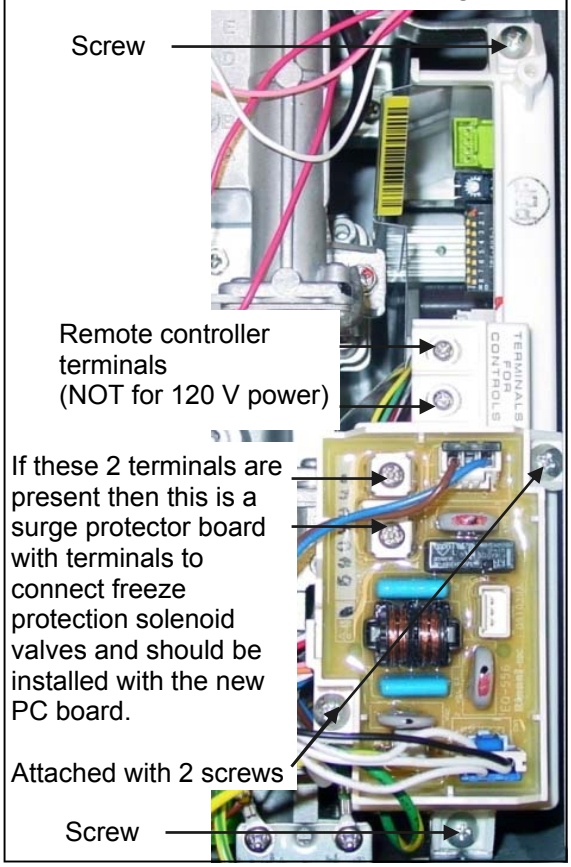
    VA and VB Series (R50LSi, R63LSe2, R75LSe, R94LSe, R75LSi, R94LSi)

    Switches 1-6 (SW2):

    Replacement PC boards for the VA and VB series have an additional bank of 6 dip switches. Configure according to the diagrams based on your model and gas type. NOTE: The V53i (VB2020FFU) does not have the SW2 dip switch.

11. Attach connections and plastic cover.
12. Insert PC board and attach with two screws.
13. If a surge protector with terminals was installed on the original PC board, remove it and install it on the new PC board. See Figure 1.
14. Attach connections for the remote controller.
15. Attach plastic guard.
16. Install two ground wires at the bottom of the cabinet.
17. Perform the Gas Pressure Setting Procedure.

Figure 1


Screw
Remote controller terminals (NOT for 120 V power)
If these 2 terminals are present then this is a surge protector board with terminals to connect freeze protection solenoid valves and should be installed with the new PC board.
Attached with 2 screws
Screw

SW2 setup for V Series (R70e, R/C85e, R/C53i, R/C85i)

1	OFF - Propane Gas ON - Natural Gas
2	OFF position for models prior to these serial numbers: (on these units, the front panel does not have an "R" or "C" trade name, unless the front panel has been replaced) V1616W, V1616WC 06.02-000001 V2020W, V2020WC 05.07-000001 V2532W, V2532WC 05.05-117257 V2532FFU, V2532FFUC 05.05-117257 V2520FFU, V2520FFUC 05.05-109539 V2526W 05.05-110434 ON position for other models, serial numbers
3	OFF position
4	OFF - Residential Models ON - Commercial Models

Component Replacement Instructions

PC Board

R/C53i(PLUS), R70e, R/C85e(PLUS), R/C85i(PLUS), R50LSi, R63LSe2, V53i, R75LSe, R75LSi, R94LSe, R94LSi RC80HPe, RC80HPi, RC98HPe, RC98HPi

Note carefully the full model number of the unit.

NOTE: The V53i (VB2020FFU) does not have the SW2 dip switch.

SW2 Bank of 6	R50LSi REU-VA2019FFUD-US		R50LSi REU-VA2019FFUD-UC		R75LSi REU-VA2528FFUD-US REU-VA2528FFUD(A)-US		R75LSe REU-VA2528WD-US REU-VA2528WD(A)-US	
	NG	**LPG**	**NG**	**LPG**	**NG**	**LPG**	**NG**	**LPG**
1	ON	OFF	ON	OFF	ON	OFF	OFF	ON
2	ON	ON	ON	ON	ON	ON	OFF	OFF
3	ON	ON	ON	ON	OFF	OFF	OFF	OFF
4	ON	ON	OFF	OFF	ON	ON	ON	ON
5	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
6	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

SW2 Bank of 6	R94LSi REU-VA2535FFUD-US REU-VA2535FFUD-UC REU-VB2735FFUD-US R75LSi REU-VA2528FFUD-UC REU-VB2528FFUD-US		R94LSe REU-VA2535WD-US REU-VA2535WD-UC REU-VB2735WD-US R75LSe REU-VA2528WD-UC REU-VB2528WD-US		R63LSe2 RUE-VA2024WD(A)-UC	
	NG	**LPG**	**NG**	**LPG**	**NG**	**LPG**
1	ON	OFF	ON	OFF	ON	OFF
2	ON	ON	OFF	OFF	OFF	OFF
3	OFF	OFF	OFF	OFF	ON	ON
4	OFF	OFF	OFF	OFF	OFF	OFF
5	OFF	OFF	OFF	OFF	OFF	OFF
6	OFF	OFF	OFF	OFF	OFF	OFF

SW2 Bank of 6	RC98HPi		RC98HPe		RC80HPi		RC80HPe	
	NG	**LPG**	**NG**	**LPG**	**NG**	**LPG**	**NG**	**LPG**
1	ON	OFF	ON	OFF	ON	OFF	ON	OFF
2	ON	ON	OFF	OFF	ON	ON	OFF	OFF
3	OFF	OFF	OFF	OFF	ON	ON	ON	ON
4	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
5	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
6	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

PC Board

R/C98e(ASME), R/C98i(ASME), R98LSe(ASME), R98LSi(ASME)

1. Turn off the gas supply.
2. Turn off the 120 V power supply.
3. Remove four screws securing the front panel. Remove front panel.
4. Remove the 2 screws connecting the PC board to the water heater casing.
5. Pull out the PC board and remove the connections.
6. Adjust dip switches on the new PC board.
7. Attach connections and insert PC board.

   Switches 1-8 (SW1):

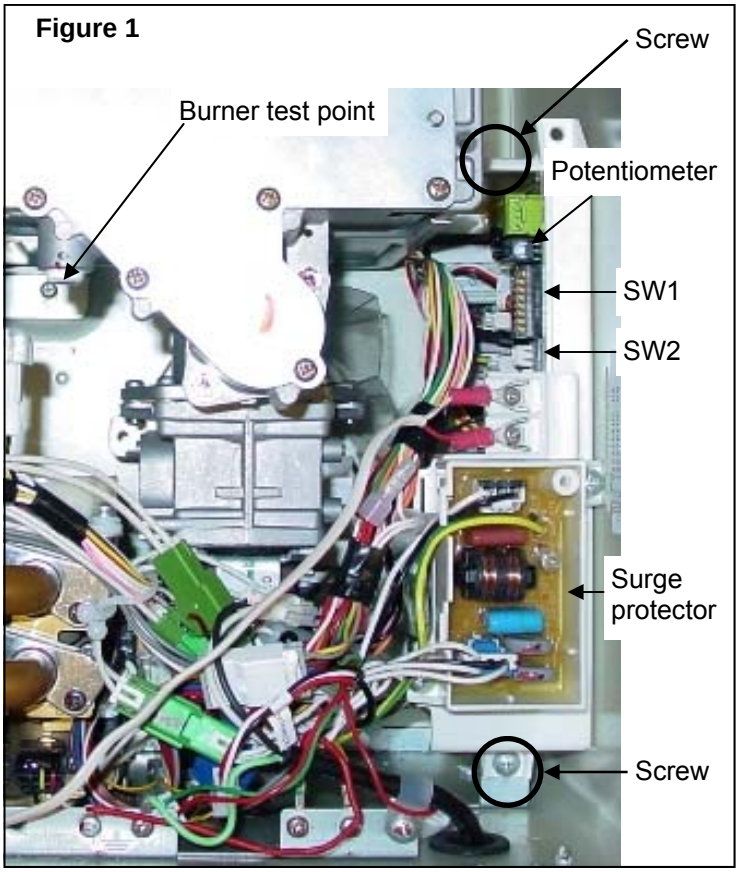
   Configure the dip switches the same as on the original PC board. If necessary, refer to the Dip Switch section or to the Operation and Installation Manual for more information on these dip switches.

   Switches 1-4 (SW2) or Switches 1-6 (SW2):

   Configure according to the diagrams based on your model and gas type.

   Attach with 2 screws.
8. Perform the Gas Pressure Setting Procedure.

Figure 1



SW2 Bank of 6	R98i		R98e		C98i		C98e		R98LSi		R98LSe	
	NG	**LPG**	**NG**	**LPG**	**NG**	**LPG**	**NG**	**LPG**	**NG**	**LPG**	**NG**	**LPG**
1	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF
2	OFF	OFF	ON	ON	OFF	OFF	ON	ON	ON	ON	OFF	OFF
3	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
4	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF
5	NA								OFF	OFF	OFF	OFF
6									OFF	OFF	OFF	OFF

Component Replacement Instructions

Water Flow Control Assembly

R/C42e, R/C53e

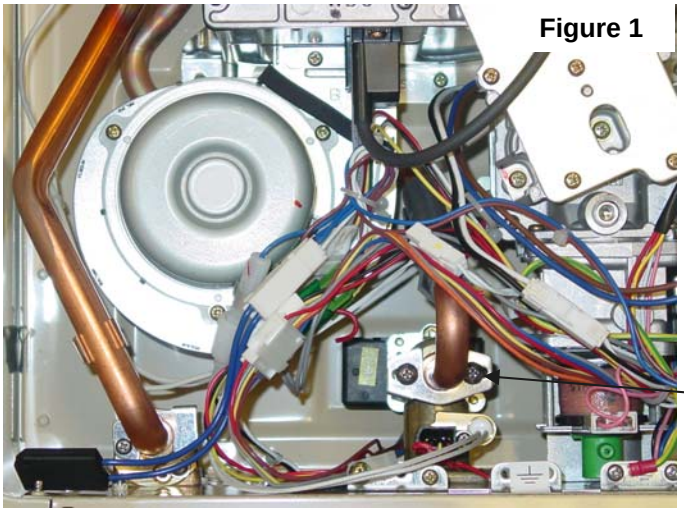
NOTICE Due to design changes, the new valve may appear different than the installed valve in color, size, and in the number of wires in the harness connections.

1. Turn off the gas supply.
2. Turn off the 120 V power supply.
3. Turn off the water supply. Drain all water from the appliance.
4. Remove four screws securing the front panel. Remove front panel.

Remove the water flow assembly

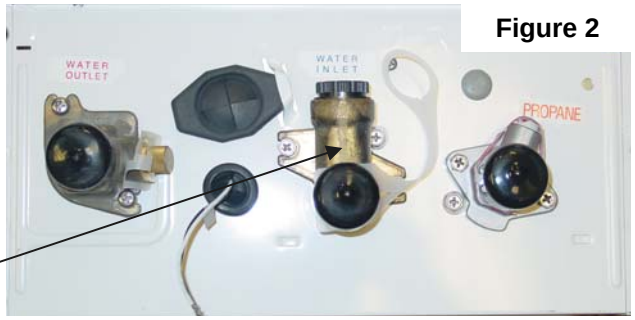
5. Remove 2 screws and bracket at the water flow assembly. The bracket can be left on the water line. Pull out the water line. (Figure 1)

Figure 1



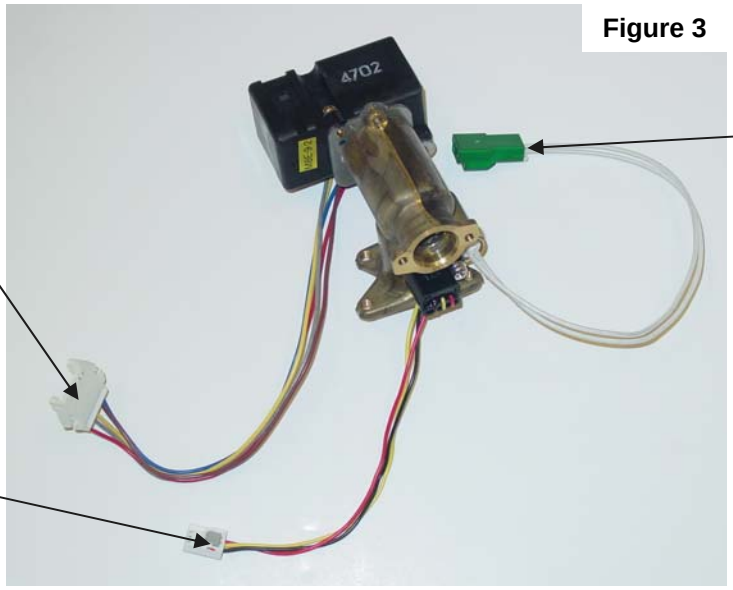
6. Remove the 3 screws attaching the water inlet to the under side of the water heater. (Figure 2).

Figure 2



7. Pull out the water flow servo assembly and disconnect the cable harnesses. (Figure 3)
   A. water flow sensor harness (black/yellow/red wires)
   B. water flow servo harness (red/blue/brown/yellow/gray or red/blue/brown/orange/yellow/gray wires)
   C. heating element

Figure 3



Assemble

8. Place the new water flow assembly inside the water heater and attach the cable harnesses.
9. Replace the O-ring on the water inlet (included in kit). Attach the water flow assembly through the bottom of the compartment to the water inlet using 3 screws. The shorter screw can be installed first to connect the water flow assembly to the bottom of the compartment. Then install the 2 longer screws through the water inlet.
10. Replace the O-ring on the water line (included in kit). Attach the water line to the water flow assembly with 2 screws and bracket.
11. Install the front panel using 4 screws. Turn on the water supply, power supply, and gas supply.
12. Open a hot water tap and ensure there are no leaks at the water heater.

Component Replacement Instructions

Water Flow Control Assembly

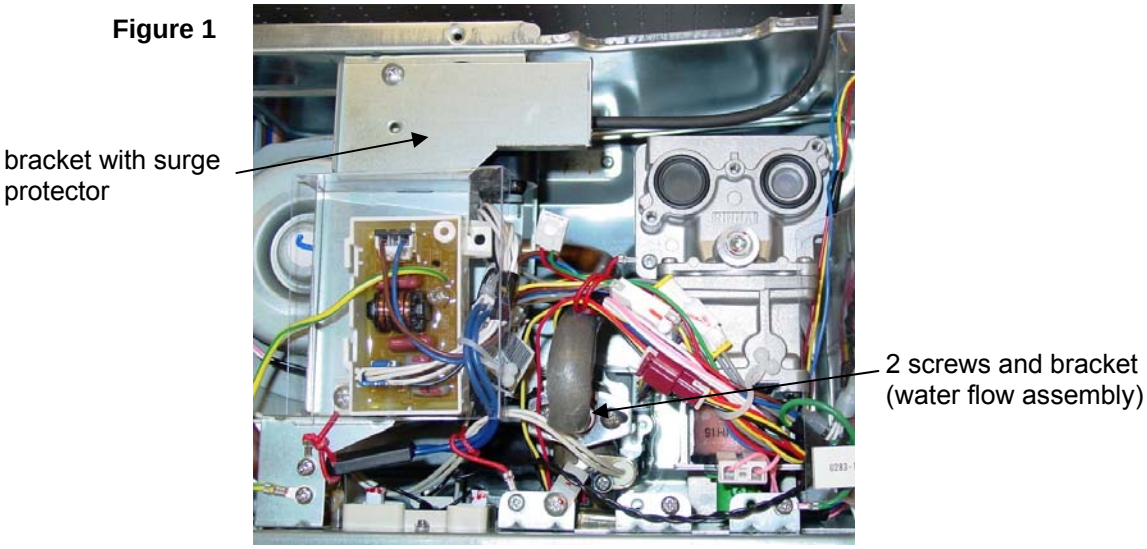
V53e, R63LSe

1. Turn off the gas supply.
2. Disconnect the 120 V power supply.
3. Turn off the water supply. Drain all water from the appliance.
4. Remove four screws securing the front panel. Remove front panel.

Remove the water flow assembly

5. Remove the bracket holding the surge protector (one screw on top of the bracket and two from the bottom of the cabinet.
6. Remove 2 screws and 1 bracket at the water flow assembly. Pull out the water line. (Figure 1)

Figure 1

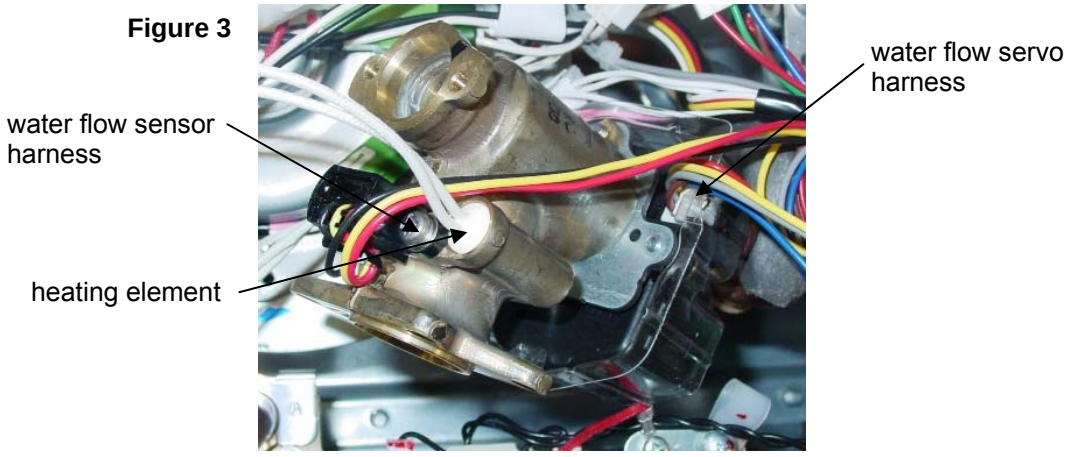


7. Remove the 3 screws attaching the water inlet to the under side of the water heater. (Figure 2).

Figure 2

8. Pull out the water flow servo assembly and disconnect the cable harnesses. (Figure 3)
   a. water flow sensor harness (black/yellow/red wires)
   b. water flow servo harness (red/blue/brown/yellow/gray or red/blue/brown/orange/yellow/gray wires) at the water flow assembly
   c. heating element

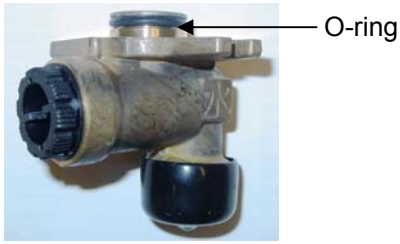
Figure 3



Assemble

9. Place the new water flow assembly inside the water heater and attach the cable harnesses.
10. Replace the O-ring on the water inlet (included in kit). (Figure 4) Attach the water flow assembly through the bottom of the compartment to the water inlet using 3 screws. The shorter screw can be installed first to connect the water flow assembly to the bottom of the compartment. Install the 2 longer screws through the water inlet.

Figure 4



11. Replace the O-ring on the water line (included in kit). Attach the water line to the water flow assembly with 2 screws and bracket.
12. Install the bracket with the surge protector.
13. Install the front panel using 4 screws.
14. Turn on the water supply, power supply, and gas supply.
15. Open a hot water tap and ensure there are no leaks at the water heater.

Component Replacement Instructions

Water Flow Control Assembly

R/C53i, R70e, R50LSi, R63LSe2, V53i, R75LSe, R75LSi

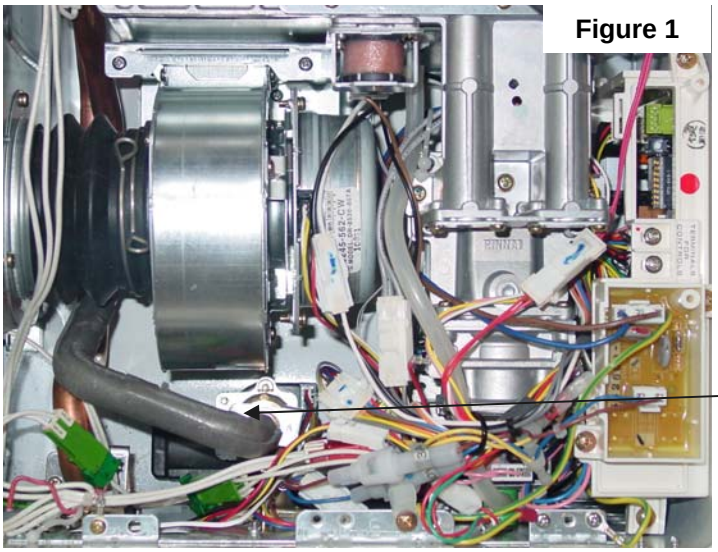
NOTICE Due to design changes, the new valve may appear different than the installed valve in color, size, and in the number of wires in the harness connections.

1. Turn off the gas supply.
2. Turn off the 120 V power supply.
3. Turn off the water supply. Drain all water from the appliance.
4. (On VB models, remove the screw covers by pressing them down and sliding them off horizontally.) Remove four screws securing the front panel. Remove front panel.

Remove the water flow assembly

5. Remove 1 screw and bracket at the water flow assembly. The bracket can be left on the water line. Pull out the water line. (Figure 1)
6. Remove the controller bracket (on indoor models only).

Figure 1



7. Remove the 4 screws attaching the water inlet to the underneath side of the water heater. (Figure 2).

Figure 2

8. Pull out the water flow servo assembly and disconnect the cable harnesses. (Figure 3)
   A. water flow sensor harness (black/yellow/red wires)
   B. water flow servo harness (red/blue/brown/yellow/gray or red/blue/brown/orange/yellow/gray wires)
   C. heating element
   D. For VB models remove the ceramic heater from the valve body

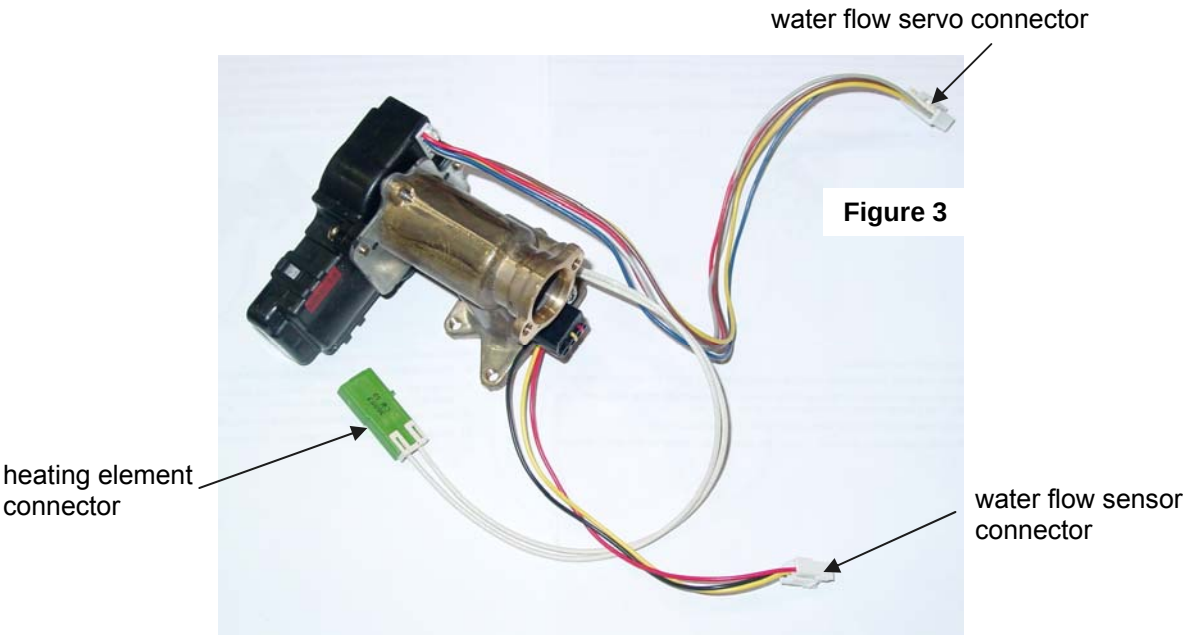


Figure 3

Assemble

9. Place the new water flow assembly inside the water heater and attach the cable harnesses. For VB models, re-install the ceramic heater.
10. Replace the O-ring on the water inlet (included in kit). Attach the water flow assembly through the bottom of the compartment to the water inlet using 4 screws. The 2 shorter screws can be installed first to connect the water flow assembly to the bottom of the compartment. Then install the 2 longer screws through the water inlet.
11. Replace the O-ring on the water line (included in kit). Attach the water line to the water flow assembly with 1 screw and bracket.
12. Install the controller bracket (on indoor models only).
13. Install the front panel using 4 screws. (On VB models, slide on the screw covers.)
14. Turn on the water supply, power supply, and gas supply.
15. Open a hot water tap and ensure there are no leaks at the water heater.

Component Replacement Instructions

Water Flow Control Assembly

R/C85e(PLUS), R/C85i(PLUS), R94LSe, R94LSi

NOTICE Due to design changes, the new valve may appear different than the installed valve in color, size, and in the number of wires in the harness connections.

1. Turn off gas supply.
2. Turn off water supply. Drain all water from appliance.
3. Turn off 120v power supply.
4. (On VB models, remove screw covers.) Remove four screws securing the front panel. Remove front panel.

Remove controller assembly (indoor VB model only)

5. Remove one screw from ignitor module bracket. Remove bracket.
6. Remove temperature controller and bracket by sliding up and out of slots on cabinet.

Remove ignitor module (outdoor VB model only)

7. Remove two screws from ignitor module bracket. Remove bracket and module.

Remove fan assembly (Figure 1)

8. Disconnect fan motor harness.
9. Disconnect air inlet thermistor harness. (indoor model only)
10. Release the fan duct from the left side by pinching open the metal clamp. (indoor model only)
11. Remove two screws that attach the fan assembly to the bottom of the combustion chamber.
12. Remove fan assembly. On V and VA models, remove the solenoid harness on the manifold to make room to pull out the fan assembly.

Remove water flow servo valve and bypass valve

13. Remove two screws and brackets at the bypass valve. Remove two copper tubes.
14. Remove two screws attaching the water inlet to the bottom of the water heater cabinet. (Figure 3)
15. Remove two screws attaching the water flow servo valve to the bottom of the water heater cabinet.
16. Disconnect the wire harnesses (water flow sensor harness - black, yellow, red wires; bypass servo assembly harness - white, red, yellow, orange, brown wires; water flow servo valve harness - 5-8 multicolored wires depending on model). (Figure 4)

Figure 1

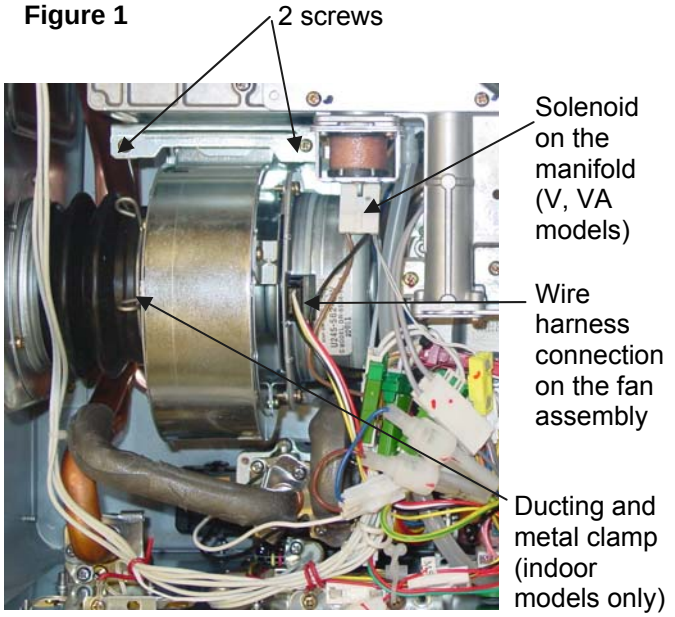

2 screws
Solenoid on the manifold (V, VA models)
Wire harness connection on the fan assembly
Ducting and metal clamp (indoor models only)

Figure 2

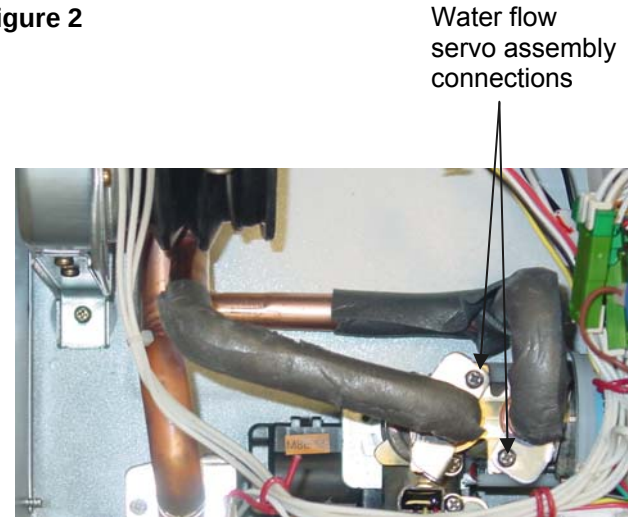
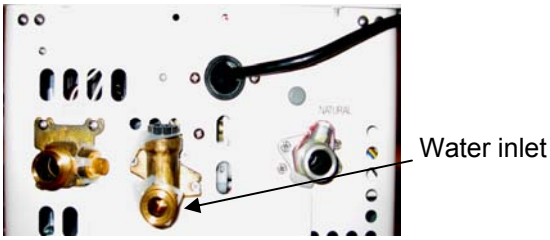


Figure 3



Water Flow Control Assembly

R/C85e(PLUS), R/C85i(PLUS), R94LSe, R94LSi

17. For VB models only, remove one screw that is securing ceramic heater. Remove ceramic heater from water flow servo assembly.
18. Pull out the water flow servo assembly and bypass servo assembly.
19. Remove two screws to separate the bypass servo assembly from the water flow servo assembly. (Figure 5)

Reinstall water flow servo valve and bypass valve

20. Replace the O-ring (included in kit) between the water flow servo assembly and the bypass servo assembly. Attach the water flow servo assembly to the bypass assembly with two screws.
21. Place inside the heater and attach the wire harnesses.
22. For VB models only, reinstall ceramic heater.
23. Replace the O-ring on the water inlet (included in kit). Attach the water flow assembly to the bottom of the water heater cabinet using two short screws. Then install the two longer screws through the water inlet.
24. Replace the O-ring on the copper lines (included in kit). Attach the two copper lines to the bypass valve, with one bracket and one screw for each line.

Reinstall fan assembly

25. Reconnect fan motor harness.
26. Reconnect air inlet thermistor harness. (indoor model only)
27. Reinstall the fan duct. (indoor model only)
28. Install two screws that attach the fan assembly to the bottom of the combustion chamber.

Install controller assembly (indoor VB model only)

29. Reinstall temperature controller and bracket.
30. Reinstall ignitor module bracket with one screw.

Install ignitor module (outdoor VB model only)

31. Install bracket and ignitor module with two screws.

Close up

32. Turn on the water supply, power supply, and gas supply.
33. Open hot water tap and ensure there are no leaks at the water heater.
34. Install front panel using four screws. Reinstall screw covers.

Figure 4

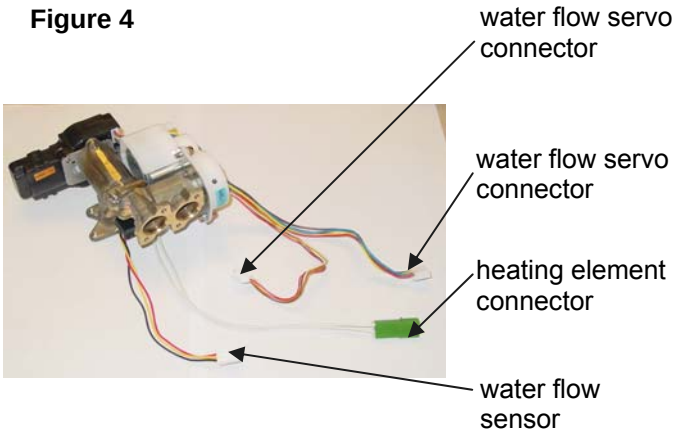


Figure 5

Water Flow Control Assembly

R/C98e(ASME), R/C98i(ASME), R98LSe(ASME), R98LSi(ASME)

1. Turn off the gas supply.
2. Turn off the 120 V power supply.
3. Turn off the water supply. Drain all water from the appliance.
4. Remove four screws securing the front panel. Remove front panel.
5. Remove 2 screws and 2 brackets at the water flow servo assembly. Pull out the water lines. (Figure 1)
6. Disconnect the wiring harnesses from the water flow sensor, heating element, water flow servo assembly, and bypass servo assembly. (Figure 1)
7. Remove the 4 screws attaching the water inlet to the underneath side of the water heater. (Figure 2)
8. Pull out the water flow servo assembly and bypass servo assembly. (Figure 3)
9. Remove 2 screws in order to separate the bypass servo assembly from the water flow servo assembly. (Figure 3)
10. Replace the O-ring (included in kit) between the water flow servo assembly and the bypass servo assembly. Attach the new water flow servo assembly to the bypass servo assembly with 2 screws.
11. Reconnect the wire harnesses (4).
12. Place inside the water heater.
13. Attach the water flow assembly to the water inlet using 4 screws. The 2 shorter screws can be installed first to connect the water flow assembly to the bottom of the compartment. Install the 2 longer screws through the water inlet.
14. Replace the O-ring on the water lines (included in kit). Attach the two water lines to the bypass servo assembly with 1 screw each.
15. Install the front panel using 4 screws.
16. Turn on the water supply, power supply, and gas supply.
17. Open a hot water tap and ensure there are no leaks at the water heater.

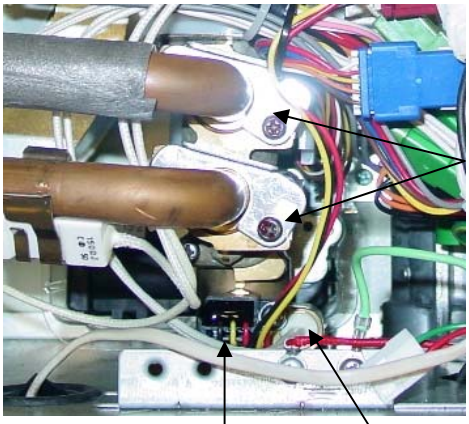


Figure 1

Figure 2

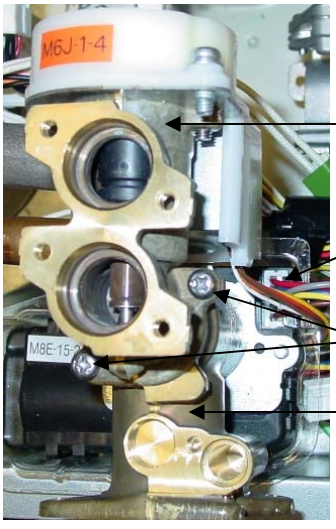


Figure 3

Water Flow Control Assembly

RC80HPe, RC80HPi,
RC98HPe, RC98HPi

1. Turn off gas supply.
2. Turn off water supply. Drain all water from appliance.
3. Turn off 120v power supply.
4. Remove four screws securing the front panel. Remove front panel.

Remove controller assembly (indoor models only)

5. Remove temperature controller. Remove two screws for temperature controller bracket. Remove bracket.

Remove water flow servo valve

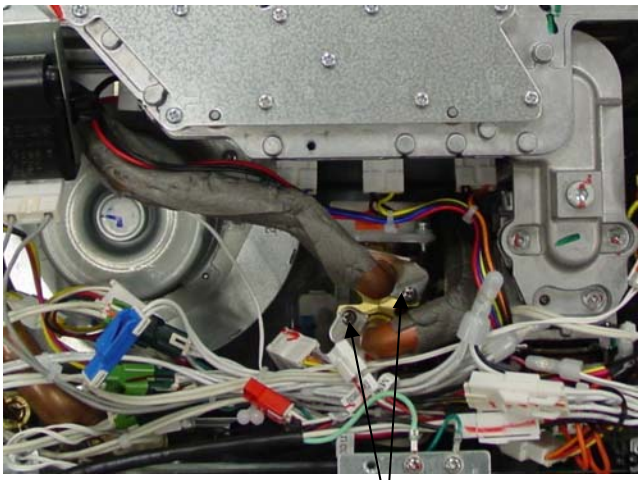
6. Remove two screws and brackets at the bypass valve. Remove two copper tubes. (Figure 1).
7. Remove four screws attaching the water inlet to the bottom of the water heater cabinet.
8. Disconnect the wire harnesses (water flow sensor harness - black, yellow, red wires; bypass servo assembly harness - white, red, yellow, orange, brown wires, water flow servo valve harness - gray, brown, orange, yellow, white, pink, blue, red). Remove heating element.
9. Pull out the water flow servo assembly and bypass servo assembly.
10. Remove two screws in order to separate the bypass servo assembly from the water flow servo assembly.

Reinstall water flow servo valve

11. Replace the O-ring (included in kit) between the water flow servo assembly and the bypass servo assembly. Attach the new water flow servo assembly to the bypass assembly with two screws.
12. Place inside the heater and attach the wire harnesses. Install heating element.
13. Replace the O-ring on the water inlet (included in kit). Attach the water flow assembly to the water inlet using four screws. The two shorter screws can be installed first to connect the water flow assembly to the bottom of the cabinet. Then install the two longer screws through the water inlet.
14. Replace the O-ring on the water lines (included in kit). Attach the two water lines to the bypass valve, with one bracket and one screw for each line.

Install controller assembly (indoor models only)

15. Install temperature controller bracket with two screws. Install temperature controller.
16. Turn on the water supply, power supply, and gas supply.
17. Open hot water tap and ensure there are no leaks at the water heater.
18. Install front panel using four screws.



Water flow servo assembly connections

Heat Exchanger

R/C42e, R/C53e, V53e, R63LSe

1. Turn off the gas supply.
2. Turn off the 120 V power supply.
3. Turn off the water supply. Drain all water from the appliance.
4. Remove four screws securing the front panel. Remove front panel.
5. On the V53e and R63LSe, remove the screws (3) holding the bracket with the surge protector. (Figure 1)
6. Disconnect the wire harness at the fan assembly. (Figure 2)
7. Remove screws and brackets securing the water line connections. (Figure 1)
8. Remove the 3 screws that attach the gas manifold to the gas valve. These screws are machine screws and must be used at these locations. (Figure 1)
9. Remove the 6 screws that attach the gas manifold to the combustion chamber (part of the heat exchanger assembly). (Figure 1)
10. Pull out the gas manifold.

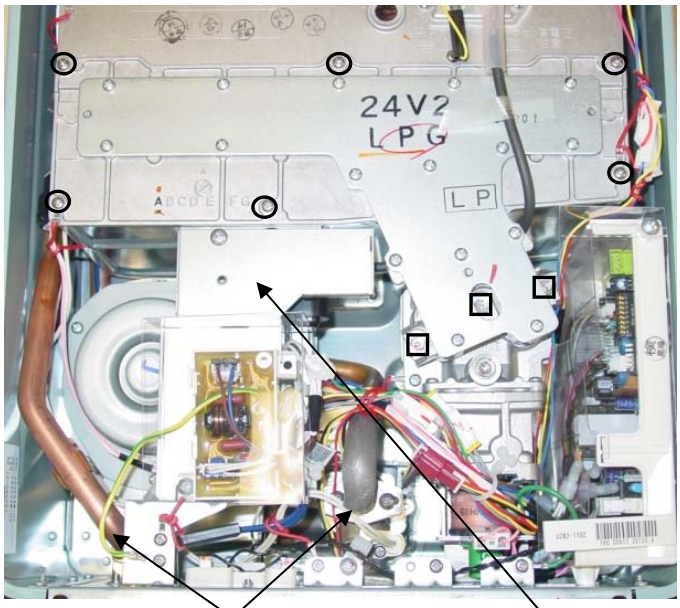


Figure 1 Water Connections Bracket

6 screws ○ (gas manifold)

3 machine screws □ (gas valve)

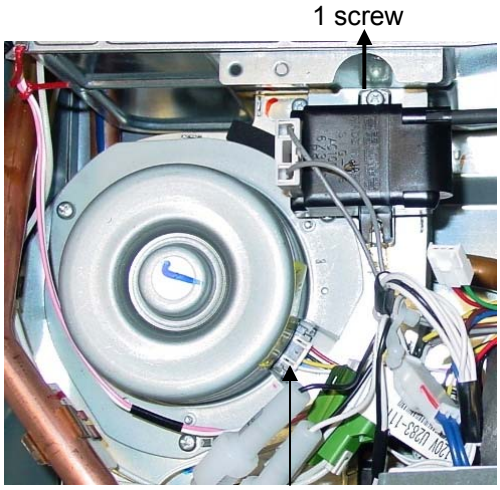


Figure 2 Wire Harness Connector

Heat Exchanger

R/C42e, R/C53e, V53e, R63LSe

11. Remove the clips and screws (5 for the V53e and R/C42; 6 for the R/C53 and R63LSe) attaching the burner cover plate to the combustion chamber. (Figure 3)
12. Remove the 2 screws attaching the burner to the heat exchanger. Pull out the burner. (Figure 3)
13. Disconnect wire harnesses:
    A. Thermal fuse connectors (two) from bundle near PCB (BK to RD and WT to RD)
    B. Disconnect overheat bimetal from upper right heat exchanger.
    C. Heat exchanger thermistor connector from bundle near PCB (WT/WT to WT/PK)
    D. Heating element connectors: water flow servo assembly, hot water outlet, heat exchanger heating elements (at bottom left), frost sensing switch (bottom center).
    E. Ignitor harness in front of fan housing (GY/GY)
14. Remove the 4 screws connecting the heat exchanger to the casing. (Figures 4 and 5)
15. Pull out the assembly.

IMPORTANT: Take note of wire harness routing prior to removal.

16. Remove overheat bimetal from upper right heat exchanger. (one screw) Install on new heat exchanger.
17. Remove thermistor and o ring from upper left heat exchanger. (two screws, one clip) Install thermistor and new o ring (in kit) on new heat exchanger.
18. Remove thermal fuse harness and clips from around heat exchanger. Install on new heat exchanger and connect to overheat bimetal connector.
19. Remove heating elements and clips from heat exchanger. Install on new heat exchanger.
20. Remove ignitor module and bracket from bottom of combustion chamber.

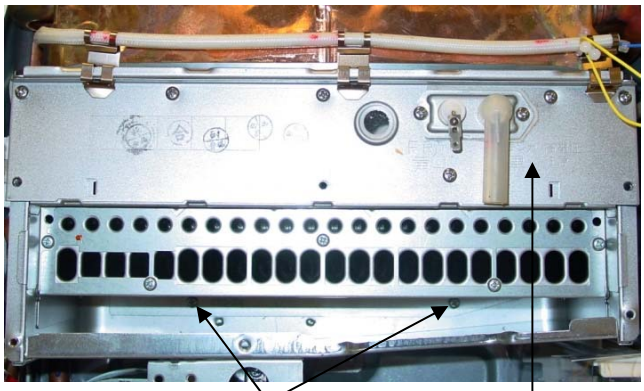


Figure 3 Screws attaching burner — Burner cover plate

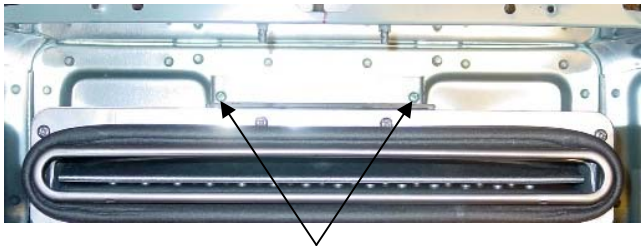


Figure 4 Top attachment screws

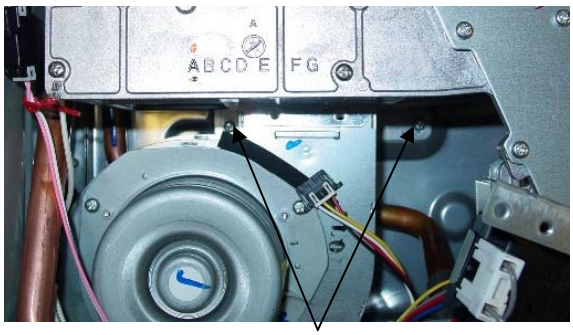


Figure 5 Bottom attachment screws

21. Remove the fan assembly (four screws) and install on new heat exchanger.
22. Install ignitor module and bracket on new heat exchanger.
23. Remove the flue outlet (seven screws) and install on the new heat exchanger.
24. Install the largest O-ring (included in kit) over the water outlet tube and the smaller O-ring (included in kit) over the water inlet tube. (Figure 1)
25. Install the 4 screws at the top and bottom of the heat exchanger to the casing. (Figures 4 and 5)
26. Insert the burner and place the burner cover plate into position. Attach the burner cover plate first with screws (5 for the V53e and R/C42; 6 for the R/C53 and R63LSe) and then attach the burner with 2 screws. (Figure 3)
27. Make sure that the black gaskets (Figure 6) are intact on the gas control assembly. Make sure that the ribbed side faces toward the manifold and that the flat side faces toward the gas valve.
28. Attach the gas manifold with 3 machine screws at the gas control assembly. (Figure 1)
29. Attach the gas manifold with 6 screws at heat exchanger. (Figure 1)
30. Connect wire harnesses:
    A. Thermal fuse connectors (two) from bundle near PCB (BK to RD and WT to RD)
    B. Heat exchanger thermistor connector from bundle near PCB (WT/WT to WT/PK)
    C. Heating element connectors: water flow servo assembly, hot water outlet, heat exchanger heating elements (at bottom left), frost sensing switch (bottom center).
    D. Ignitor harness in front of fan housing (GY/GY).
31. Attach the wire harness to the fan assembly (white, yellow, black, red wires).
32. Attach the brackets to the water line connections. (Figure 1)
33. On the V53e and R63LSe, install the bracket with the surge protector (3 screws). (Figure 1)
34. Install the front panel using 4 screws.
35. Turn on the water supply, power supply, and gas supply.

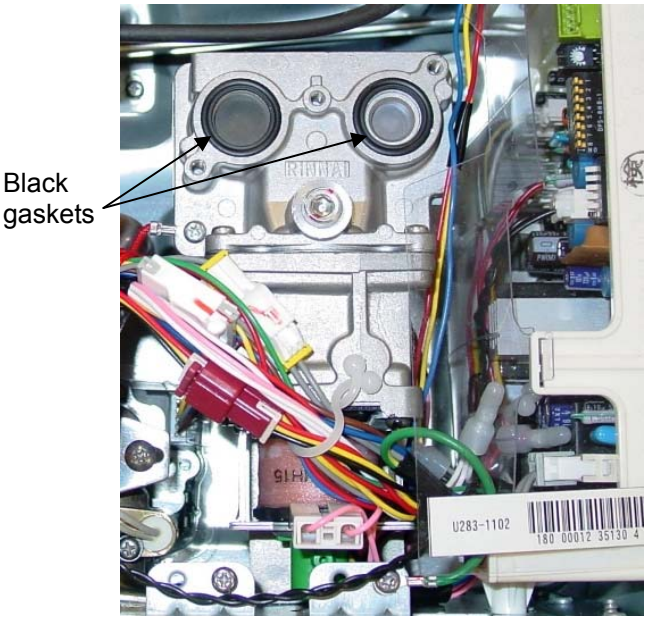


Figure 6

Heat Exchanger

R70e, R/C85e(PLUS), R63LSe2, R75LSe, R94LSe

1. Turn off the gas supply.
2. Turn off the 120 V power supply.
3. Turn off the water supply. Drain all water from the appliance.
4. Remove four screws securing the front panel. Remove front panel.
5. **On VB models**, remove one screw from ignitor module bracket. Remove bracket.

Figure 1

Remove Fan Assembly (Figure 2)

6. Disconnect wire harness at the fan assembly.
7. **On V and VA models**, pull out the harness attached to the solenoid on the manifold to make room to pull out the fan assembly.
8. Remove the 2 screws that attach the fan assembly to the bottom of the burner.
9. Pull out the fan assembly.

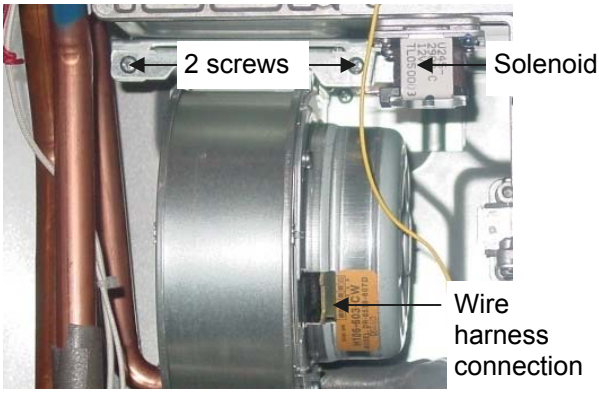


Figure 2

Disconnect Water Lines (Figure 3)

10. Remove 1 screw from the water outlet bracket. Remove the bracket by rotating and moving it up toward the bend in the tube where the diameter is smaller.
11. **For models with a bypass valve**, remove 2 screws and 2 brackets at the bypass servo assembly.
    For models without a bypass valve, remove 1 screw and 1 bracket at the water flow servo assembly.

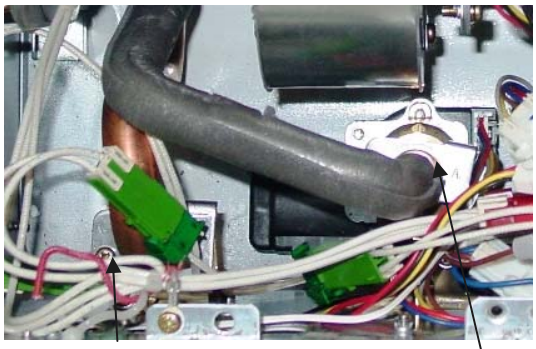


Figure 3

Disconnect PC Board (Figure 4)

12. Remove 1 screw connecting the PC Board to the heat exchanger assembly.

Heat Exchanger

R70e, R/C85e(PLUS), R63LSe2, R75LSe, R94LSe

Remove Gas Manifold (Figure 4)

13. Remove the 3 screws that attach the gas manifold to the gas valve. These screws are machine screws and must be used at these locations.
14. Remove the 6 screws that attach the gas manifold to the combustion chamber (part of the heat exchanger assembly).
15. Pull out the ignition line and remove the gas manifold.
16. **On VB models**, disconnect the two solenoid harnesses form the manifold (black/red and black/orange).

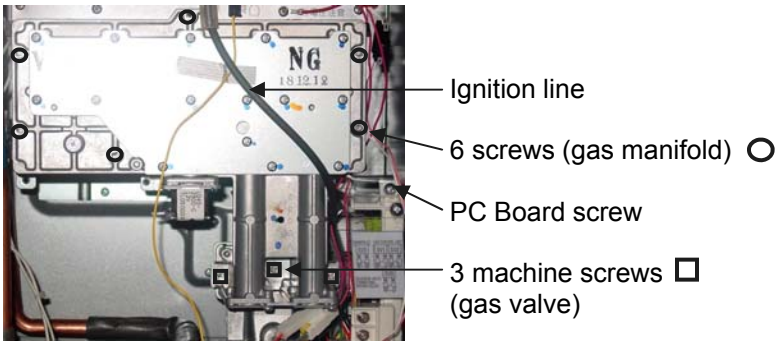


Figure 4

Remove Burner and Burner Cover Plate (Figure 5)

17. Remove the 8 screws attaching the burner cover plate to the combustion chamber. Move the cover plate to the side. It is not necessary to disconnect the wire harness from the burner cover plate.
18. Remove the 2 screws attaching the burner to the heat exchanger. Pull out the burner.

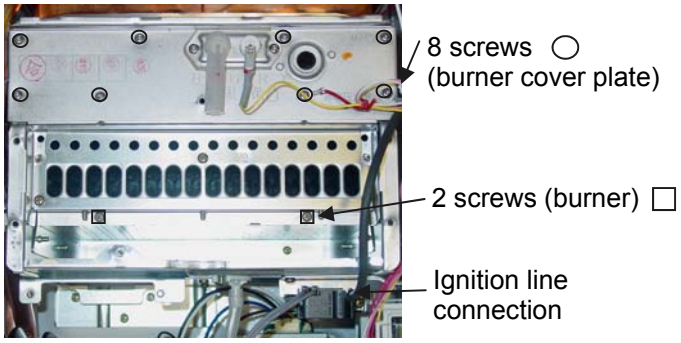


Figure 5

Disconnect Wire Harness Attachments and Screws Holding the Heat Exchanger

19. Disconnect the wire harnesses:

    A. 1. Thermal fuse connector(s) from bundle near PCB (RD/RD to RD/RD) VB Models: (WT to RD and WT to WT)
    B. 2. Heat exchanger thermistor connector from bundle near PCB. (WT/WT to PK/WT) VB Models: (WT/WT to PK/PK)
    C. 3. Heating element connectors: water flow servo assembly, hot water outlet, heat exchanger heating elements (at bottom), frost sensing switch (bottom center). NOTE: Some models do not have a connector at water outlet or water flow servo heating elements and must be removed from the assembly.
    D. 4. Ignitor module harness (GY/GY) N/A for VB models

20. Remove 3 screws behind the fan. (Figure 6)
21. Remove 2 screws above the exhaust. Pull assembly from the unit. (Figure 7)

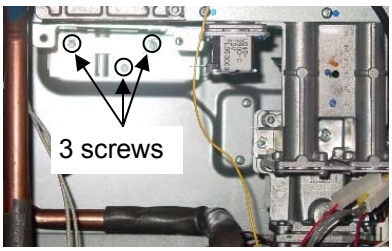
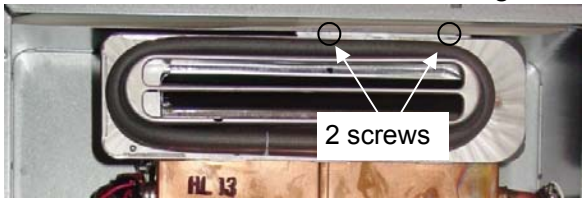


Figure 7

Figure 8



Heat Exchanger

R70e, R/C85e(PLUS), R63LSe2, R75LSe, R94LSe

⚠ WARNING Failure to correctly assemble the components according to these instructions may result in a gas leak or explosion.

Installation

22. Install the largest O-ring (included in kit) over the water outlet tube and the two smaller O-rings (included in kit) over the bypass servo tubes. (Figure 3)
23. Relocate water heater components:

    Important: Take note of wire harness routing prior to removal.

    A. Remove overheat bimetal from upper left heat exchanger. (one screw) Remove thermal fuse harness and clips from around heat exchanger. Install bimetal and thermal fuse on new heat exchanger.

    B. Remove thermistor and o ring from upper right heat exchanger. Install thermistor and new o ring (in kit) on new heat exchanger.

    C. Remove heating elements, sensor and clips from heat exchanger. Install on new heat exchanger.

    D. Remove ignitor module from bottom of combustion chamber. Install on new heat exchanger.
24. Install the new heat exchanger using 2 screws above the exhaust and 3 screws behind the fan. (Figures 6, 7)
25. Connect wire harnesses:

    A. Thermal fuse connector(s) from bundle near PCB (RD/RD to RD/RD) VB Models: (WT to RD and WT to WT)

    B. Heat exchanger thermistor connector from bundle near PCB. (WT/WT to PK/WT) VB Models: (WT/WT to PK/PK)

    C. Heating element connectors: water flow servo assembly, hot water outlet, heat exchanger heating elements (at bottom), frost sensing switch (bottom center). NOTE: Some models do not have a connector at water outlet or water flow servo heating elements and must be reinstalled.

    D. Ignitor module harness (GY/GY) N/A for VB models
26. (Figure 5) Replace the combustion chamber packing (included in kit) removing any residue from old packing. Insert the burner and place the burner cover plate into position. Attach the burner cover plate first with 8 screws and then attach the burner with 2 screws.

Install Gas Manifold and Connect PC Board

27. Make sure that the two black packings (Figure 8) are intact on the gas control assembly. Make sure that the ribbed side faces toward the manifold and that the flat side faces toward the gas valve.Attach the gas manifold with 3 machine screws at the gas control assembly. Replace the lower and upper packings (included in kit) for the manifold plate removing any residue.
28. **On VB models**, connect the two solenoid harnesses from the manifold (black/red and black/orange).
29. Attach the gas manifold with 6 screws at heat exchanger.
30. Attach the ignition line at the burner cover plate.
31. Attach the PC Board to the heat exchanger with 1 screw.

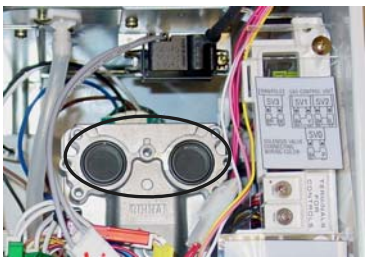


Figure 8

Component Replacement Instructions

Heat Exchanger

R70e, R/C85e(PLUS), R63LSe2, R75LSe, R94LSe

Connect Water Lines (Figure 3)

32. Attach the water outlet line and bracket with 1 screw.
33. Depending on model, attach the line to the water flow servo assembly with 1 screw and 1 bracket or attach the lines to the bypass valve with 1 screws and 1 brackets for each line.

Install Fan Assembly (Figure 2)

34. Install the fan assembly by inserting the tab on the fan assembly into the slot at the base of the heat exchanger and attaching with two screws.
35. Attach the wire harness to the solenoid on the gas manifold (brown, black wires).
36. Attach the wire harness to the fan assembly (white, yellow, black, red wires).
37. **On VB models**, install the ignitor module bracket with one screw.
38. Install the front panel using 4 screws. Turn on the water supply, power supply, and gas supply. Check for gas leaks.

Heat Exchanger

R/C53i(PLUS), R/C85i(PLUS), V53i, R50LSi, R75LSi, R94LSi

1. Turn off the gas supply.
2. Turn off the 120 V power supply.
3. Turn off the water supply. Drain all water from the appliance.
4. Remove four screws securing the front panel. Remove front panel.
5. **On VB models except the VB2020**, remove one screw from ignitor module bracket. Remove bracket.
6. Remove temperature controller and bracket by sliding up and out of slots on cabinet. On the VB2020, remove one screw from the status monitor assembly at the gas manifold. Remove module.

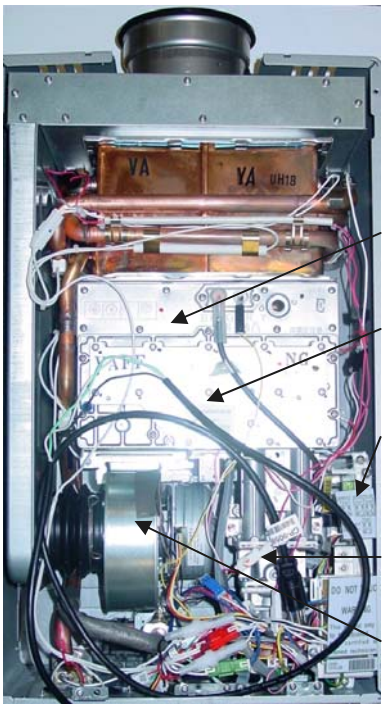


Figure 1

Remove Fan Assembly (Figure 2)

7. Disconnect wire harness at the fan assembly. Disconnect the air temperature thermistor (two white wires) at the connection with the white and orange wires within the wire bundle.
8. **On V and VA models and VB2020**, pull out the harness attached to the solenoid on the manifold to make room to pull out the fan assembly.
9. Remove the 2 screws that attach the fan assembly to the bottom of the burner.
10. Loosen the ducting from the fan assembly by pinching open the metal clamp. Pull out the fan assembly.

Disconnect Water Lines and PC Board (Figure 2)

11. Remove 1 screw from the water outlet bracket. Remove the bracket by rotating and moving it up toward the bend in the tube where the diameter is smaller.
12. **For models with a bypass valve**, remove 2 screws and 2 brackets at the bypass servo assembly.
    For models without a bypass valve, remove 1 screw and 1 bracket at the water flow servo assembly.
13. Remove 1 screw connecting the PC Board to the heat exchanger assembly.

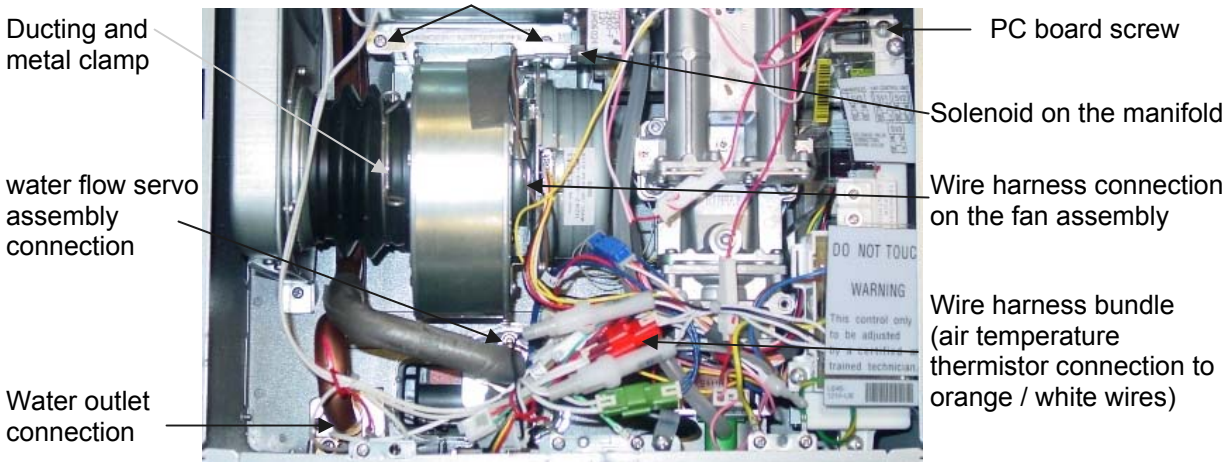

2 screws
Ducting and metal clamp
water flow servo assembly connection
Water outlet connection
PC board screw
Solenoid on the manifold
Wire harness connection on the fan assembly
Wire harness bundle (air temperature thermistor connection to orange / white wires)

Figure 2

Heat Exchanger

R/C53i(PLUS), R/C85i(PLUS), V53i, R50LSi, R75LSi, R94LSi

Remove Gas Manifold (Figure 3)

14. Remove the 3 screws that attach the gas manifold to the gas valve. These screws are machine screws and must be used at these locations.
15. Remove the 6 screws that attach the gas manifold to the combustion chamber (part of the heat exchanger assembly).
16. Pull out the ignition line and remove the gas manifold.
17. **On VB models except the VB 2020**, disconnect the two solenoid harnesses from the manifold (black/red and black/orange).

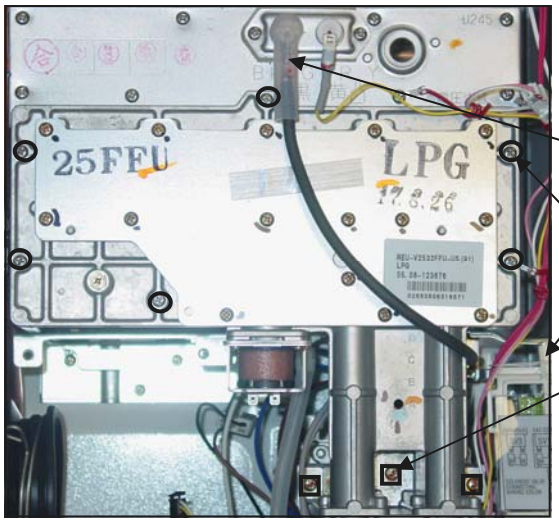


Figure 3

Remove Burner and Burner Cover Plate (Figure 4)

18. Remove the 8 screws attaching the burner cover plate to the combustion chamber. Move the cover plate to the side. It is not necessary to disconnect the wire harness from the burner cover plate.
19. Remove the 2 screws attaching the burner to the heat exchanger. Pull out the burner.
20. Disconnect the pressure tube from the heat exchanger.

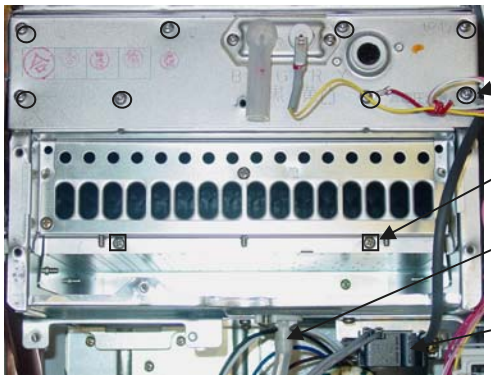
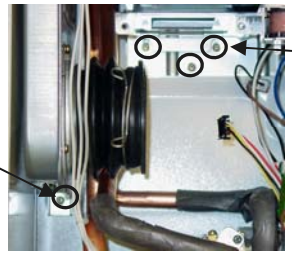


Figure 4

21. Disconnect wire harnesses:
    A. Thermal fuse connector(s) from bundle near PCB (RD/RD to RD/RD) VB Models: (WT to RD and WT to WT)
    B. Heat exchanger thermistor connector from bundle near PCB. (WT/WT to PK/WT) VB Models: (WT/WT to PK/PK)
    C. Heating element connectors: water flow servo assembly, hot water outlet, heat exchanger heating elements (at bottom), frost sensing switch (top left heat exchanger). NOTE: Some models do not have a connector at water outlet or water flow servo heating elements and must be removed from the assembly.
    D. Ignitor module harness (GY/GY) N/A for VB models
    E. VB models only: Burner sensor from bundle near PCB. (BK/BK)
22. Remove 8 screws connecting the assembly to the water heater casing assembly. (Figures 6, 7)

Near fan assembly location

Figure 6



At right and left upper corners of water heater

2 screws **Figure 7** 2 screws

Heat Exchanger

R/C53i(PLUS), R/C85i(PLUS), V53i, R50LSi, R75LSi, R94LSi

23. Pull out the assembly. Remove 3 brackets on the side and back holding the fusible link.
24. Remove the 9 screws at the cover plate over the air intake passage. (Figure 8)
25. Remove the 4 screws attaching the heat exchanger to the air intake/exhaust assembly. (Figure 9)

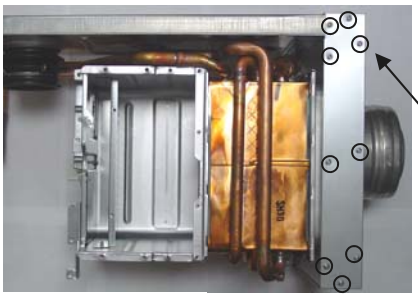


Figure 8

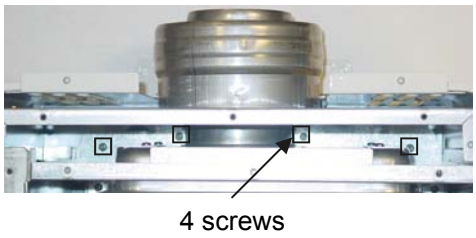


Figure 9

26. Pull apart the heat exchanger and air intake/exhaust assembly. (Figure 10)
27. Remove 4 screws attaching the bracket on top of the heat exchanger. Pull off the bracket. (Figure 11)

Figure 10

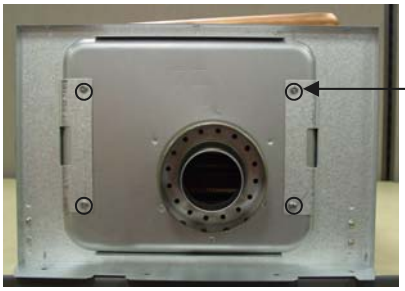


Figure 11

⚠ WARNING Failure to correctly assemble the components according to these instructions may result in a gas leak or explosion.

28. Install the O-ring (included in kit) over the water outlet tube and the O-ring (included in kit) over the water flow servo tube or bypass tube. (Figure 2)
29. Install the bracket over the replacement heat exchanger. Push evenly on both sides of the bracket. Attach with four screws. (Figure 10)
30. Push the heat exchanger into the air intake/exhaust assembly. Attach with four screws. (Figure 8)
31. Attach the cover plate over the air intake passage with 9 screws. (Figure 7)
32. Relocate water heater components:

Important: Take note of wire harness routing prior to removal.

A. Remove overheat bimetal from upper left heat exchanger. (one screw) Remove thermal fuse harness and clips from around heat exchanger. Install bimetal and thermal fuse on new heat exchanger. Use 2 clips on back and 1 clip on side for thermal fuse

B. Remove thermistor and o ring from upper right heat exchanger. Install thermistor and new o ring (in kit) on new heat exchanger.

C. Remove heating elements, sensor and clips from heat exchanger. Install on new heat exchanger.Remove ignitor module from bottom of combustion chamber. Install on new heat exchanger.

D. VB models only: Remove burner sensor from right side of heat exchanger. Install with new gasket (in kit) on new heat exchanger.

33. *(Figures 6a, 6b)* Slide the assembly into the casing assembly and attach with 8 screws starting at the top of the water heater.
34. Connect wire harness attachments. (Figure 5)
    A. Thermal fuse connector(s) at bundle near PCB (RD/RD to RD/RD) VB Models: (WT to RD and WT to WT)
    B. Heat exchanger thermistor connector at bundle near PCB. (WT/WT to PK/WT) VB Models: (WT/WT to PK/PK)
    C. Heating element connectors: water flow servo assembly, hot water outlet, heat exchanger heating elements (at bottom), frost sensing switch (top left heat exchanger). NOTE: Some models do not have a connector at water outlet or water flow servo heating elements.
    D. Ignitor module harness (GY/GY) N/A for VB models
    E. VB models only: Burner sensor from bundle near PCB. (BK/BK)
35. Connect the pressure tube.
36. (Figure 4) Replace the combustion chamber packing (included in kit) removing any residue from old packing. Insert the burner and place the burner cover plate into position. Attach the burner cover plate first with 8 screws and then attach the burner with 2 screws.
37. Make sure that the two black packings (Figure 12) are intact on the gas control assembly. Make sure that the ribbed side faces toward the manifold and that the flat side faces toward the gas valve.Attach the gas manifold with 3 machine screws at the gas control assembly. Replace the lower and upper packings (included in kit) for the manifold plate removing any residue.
38. **For VB models except the VB2020**, connect the two solenoid harnesses from the manifold (black/red and black/orange).
39. Attach the gas manifold with 6 screws at heat exchanger.
40. Attach the ignition line at the burner cover plate.
41. Attach the PC Board to the heat exchanger with 1 screw.

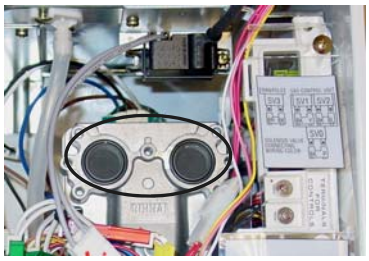


Figure 12

42. (Figure 2) Attach the water outlet line and bracket with 1 screw.
43. Depending on model, attach the line to the water flow servo assembly with 1 screw and 1 bracket or attach the lines to the bypass valve with 1 screws and 1 brackets for each line.
44. (Figure 2) Install the fan assembly by inserting the tab on the fan assembly into the slot at the base of the heat exchanger and attaching with two screws.
45. Push the ducting over the fan assembly exit and secure with the metal pinch clamp.
46. **On V and VA models and VB2020**, attach the wire harness to the solenoid on the gas manifold (brown, black wires).
47. Attach the wire harness to the fan assembly (white, yellow, black, red wires).
48. Attach the air temperature thermistor (white, white wires) to the wire harness.
49. **For VB models except the VB2020**, install the ignitor module bracket with one screw.
50. Install temperature controller and bracket. For the VB2020, install the status monitor assembly with one screw.
51. Install the front panel using 4 screws.
52. Turn on the water supply, power supply, and gas supply. Check for gas leaks.

Heat Exchanger

R/C98e(ASME), R98LSe(ASME)

1. Turn off the gas supply, the 120 V power supply, and the water supply. Drain all water from the appliance.
2. Remove four screws securing the front panel. Remove front panel.
3. Disconnect wire harness at the fan assembly, the electrical connections to the 3 solenoid valves, and the ignition line.
4. Remove 3 screws and brackets securing the water line connections. (Figure 1)
5. Remove the 2 screws that attach the gas manifold to the gas valve. These screws are machine screws and must be used at these locations. (Figure 1)
6. Remove the 5 screws that attach the gas manifold to the combustion chamber (part of the heat exchanger assembly). (Figure 1)
7. Pull out the gas manifold and remove the connector at the ignitor at the left side of the gas manifold. (GY/GY)
8. Remove the 9 screws attaching the burner cover plate to the combustion chamber. (Figure 2)
9. Remove the 2 screws attaching the burner to the heat exchanger. Pull out the burner. (Figure 2)
10. Disconnect wire harnesses:
    A. Thermal fuse connectors (two) from bundle on left side of heat exchanger (WT to WT and RD to RD)
    B. Disconnect overheat bimetal from upper right heat exchanger.
    C. Heat exchanger thermistor connector from bundle on left side of heat exchanger (WT/WT to WT/PK)
    D. Heating element connectors: water flow servo assembly, hot water outlet, heat exchanger heating elements (at bottom left), frost sensing switch (bottom center).
11. Remove the 4 screws connecting the heat exchanger to the casing. (Figure 3)
12. Pull out the assembly.
13. Relocate water heater components:

    Important: Take note of wire harness routing prior to removal.

    A. Remove overheat bimetal from upper right heat exchanger. (one screw) Install on new heat exchanger.
    B. Remove thermistor and o ring from upper left heat exchanger. (two screws, one clip) Install thermistor and new o ring (in kit) on new heat exchanger.
    C. Remove thermal fuse harness and clips from around heat exchanger. Install on new heat exchanger by sliding the harness between the water outlet and inlet tubes (figure 4) and connect to overheat bimetal connector.
    D. Remove heating elements and clips from heat exchanger. Install on new heat exchanger.
    E. Remove the fan assembly (four screws) and install on new heat exchanger. Figure 4
    F. Remove the flue outlet (six screws) and install on the new heat exchanger. Figure 5

5 screws ○ (gas manifold)

2 machine screws □ (gas valve)

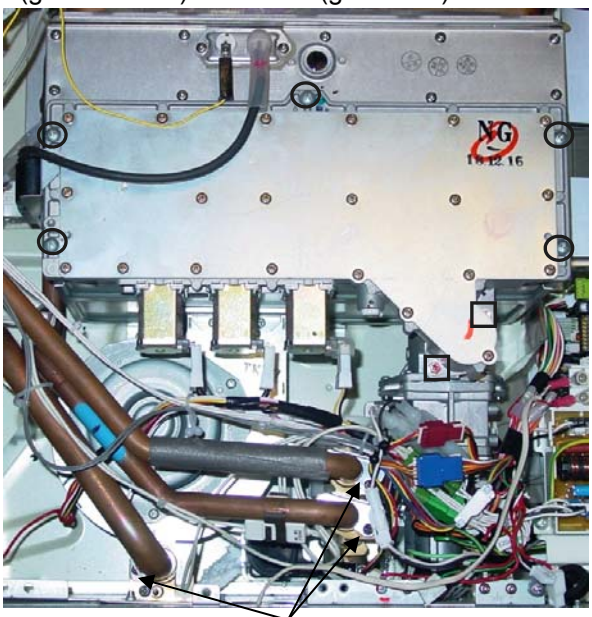
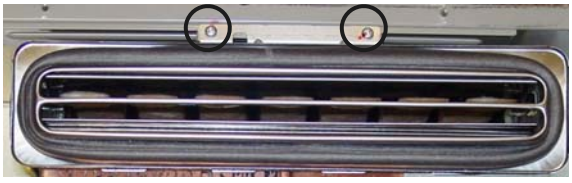


Figure 1 Water line connections

Figure 2 9 screws ○ (burner cover plate) 2 screws □ (burner)



Top screws

Figure 3 Bottom screws

Heat Exchanger

R/C98e(ASME), R98LSe(ASME)

14. Install the largest O-ring (included in kit) over the water outlet tube and the two smaller O-rings (included in kit) over the water inlet tubes. (Figure 4)
15. Attach brackets at the back and side holding the fusible link.
16. Install the 4 screws at the top and bottom of the heat exchanger to the casing. (Figure 3)
17. Insert the burner and place the burner cover plate into position. Attach the burner cover plate first with 9 screws and then attach the burner with 2 screws. (Figure 2)
18. Replace the electrode gasket. (Figure 6)
19. Make sure that the black gasket (Figure 7) is intact on the gas control assembly. Make sure that the ribbed side faces toward the manifold and that the flat side faces toward the gas valve. Replace the lower and upper gaskets (included in kit) for the manifold plate removing any residue. (Figure 8)
20. Attach the electrical connector (GY/GY) to the ignitor on the manifold and attach the gas manifold with 2 machine screws at the gas control assembly. (Figure 1)
21. Attach the gas manifold with 5 screws at heat exchanger. (Figure 1)
22. Connect wire harness attachments:
    A. Thermal fuse connectors (two) at bundle on left side of heat exchanger (WT to WT and RD to RD).
    B. Overheat bimetal at upper left heat exchanger.
    C. Heat exchanger thermistor connector at bundle on left side of heat exchanger (WT/WT to WT/PK).
    D. Heating element connectors: water flow servo assembly, hot water outlet, heat exchanger heating elements (at bottom left), frost sensing switch (bottom center).
23. Attach the ignition line at the burner cover plate.
24. Attach the 3 electrical connectors to the solenoid valves.
25. Attach the wire harness to the fan assembly (white, yellow, black, red wires).
26. Attach the brackets to the water line connections. (Figure 1)
27. Install the front panel using 4 screws. Turn on the water supply, power supply, and gas supply. Check for gas leaks.

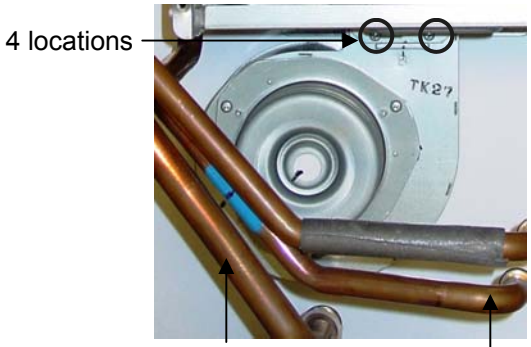


Figure 4

Figure 5

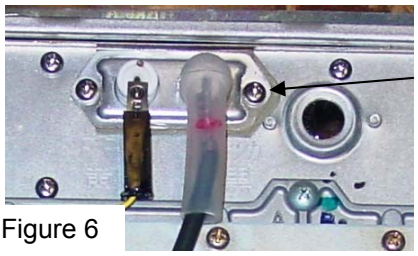


Figure 6

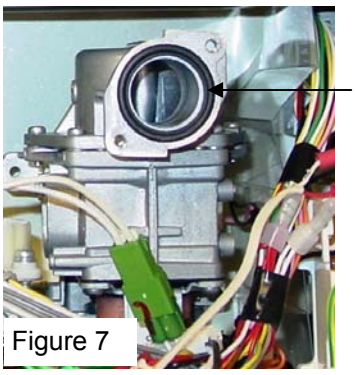


Figure 7

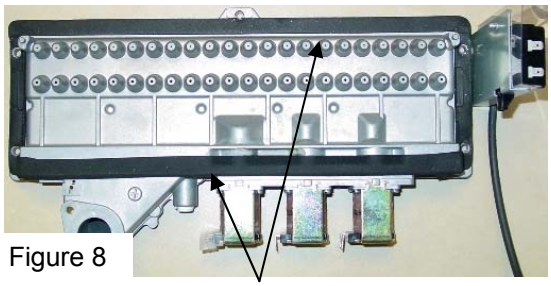


Figure 8

Gaskets

Heat Exchanger

R/C98i(ASME), R98LSi(ASME)

1. Turn off the gas supply.
2. Turn off the 120 V power supply.
3. Turn off the water supply. Drain all water from the appliance.
4. Remove four screws securing the front panel. Remove front panel.
5. Remove the bracket holding the controller (1 screw). (Figure 1)
6. Disconnect wire harness at the fan assembly, the electrical connections to the 3 solenoid valves, and the ignition line.
7. Remove 3 screws and brackets securing the water line connections. (Figure 2)
8. Remove the 2 screws that attach the gas manifold to the gas valve. These screws are machine screws and must be used at these locations. (Figure 2)
9. Remove the 5 screws that attach the gas manifold to the combustion chamber (part of the heat exchanger assembly). (Figure 2)
10. Pull out the gas manifold and remove the connector at the ignitor at the left side of the gas manifold. (GY/GY)
11. Remove the 9 screws attaching the burner cover plate to the combustion chamber. (Figure 3)
12. Remove the 2 screws attaching the burner to the heat exchanger. Pull out the burner. (Figure 3)
13. Disconnect wire harnesses:
    - A. Thermal fuse connectors (two) from bundle on left side of heat exchanger (WT to WT and RD to RD)
    - B. Disconnect overheat bimetal from upper right heat exchanger.
    - C. Heat exchanger thermistor connector from bundle on left side of heat exchanger (WT/WT to WT/PK)
    - D. Heating element connectors: water flow servo assembly, hot water outlet, heat exchanger heating elements (at bottom left), frost sensing switch (bottom center).
14. Remove the 3 screws at the seal plate at the top of the water heater. Remove the seal plate and gasket. (Figure 4)
15. Remove flue outlet vent (4 screws). (Figure 5)
16. Remove the 4 screws connecting the heat exchanger to the back of the casing. (Figure 6)
17. Pull out the assembly. (It is hooked on brackets in the casing.)

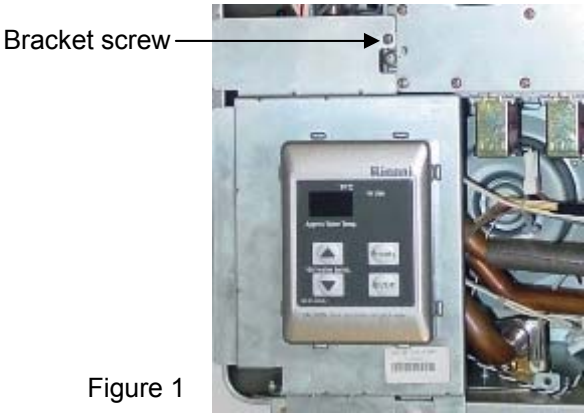


Figure 1

5 screws ◯ (gas manifold)

2 machine screws □ (gas valve)

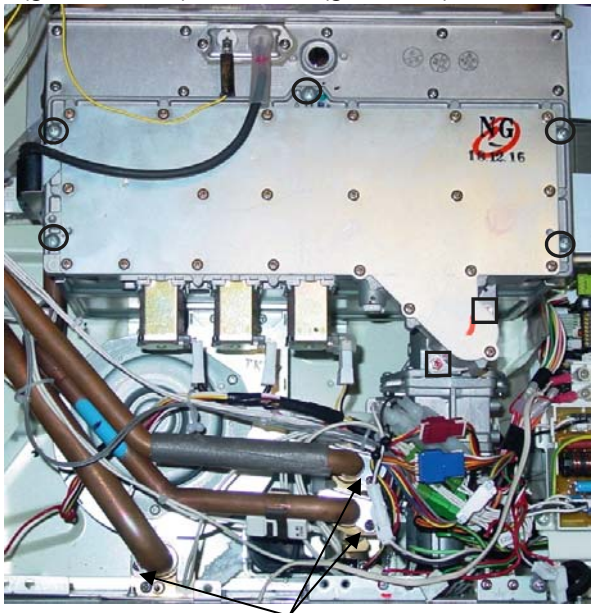


Figure 2 Water line connections

Figure 3 9 screws ◯ (burner cover plate) 2 screws □ (burner)

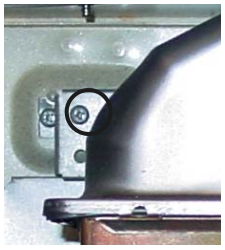
Heat Exchanger

R/C98i(ASME), R98LSi(ASME)

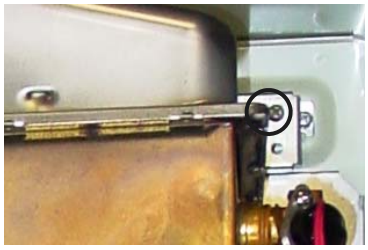
18. Relocate water heater components:
    A. Remove overheat bimetal from upper right heat exchanger. (one screw) Install on new heat exchanger.
    B. Remove thermistor and o ring from upper left heat exchanger. (two screws, one clip) Install thermistor and new o ring (in kit) on new heat exchanger.
    C. Remove thermal fuse harness and clips from around heat exchanger. Install on new heat exchanger by sliding the harness between the water outlet and inlet tubes (figure 7) and connect to overheat bimetal connector.
    D. Remove heating elements and clips from heat exchanger. Install on new heat exchanger.
    E. Remove the fan assembly (four screws) and install on new heat exchanger. Figure 7
19. Install the largest O-ring (included in kit) over the water outlet tube and the two smaller O-rings (included in kit) over the water inlet tubes. (Figure 7)
20. Install the heat exchanger hooking it on the brackets in the back.
21. Install the 4 screws at the top and bottom of the heat exchanger to the back of the casing. (Figure 6)
22. Install the flue outlet vent (4 screws) and seal plate (3 screws) and gasket at the top of the water heater. (Figures 4 and 5)
23. Insert the burner and place the burner cover plate into position. Attach the burner cover plate first with 9 screws and then attach the burner with 2 screws. (Figure 3)
24. Replace the electrode gasket. (Figure 8)
25. Make sure that the black gasket (Figure 9) is intact on the gas control assembly. Make sure that the ribbed side faces toward the manifold and that the flat side faces toward the gas valve. Replace the lower and upper gaskets (included in kit) for the manifold plate removing any residue. (Figure 10)
26. Attach the electrical connector (GY/GY) to the ignitor on the manifold and attach the gas manifold with 2 machine screws at the gas control assembly. (Figure 2)
27. Attach the gas manifold with 5 screws at heat exchanger. (Figure 2)

Figure 4

Figure 5



Top left screw



Top right screw

Figure 6

Bottom screws

4 locations

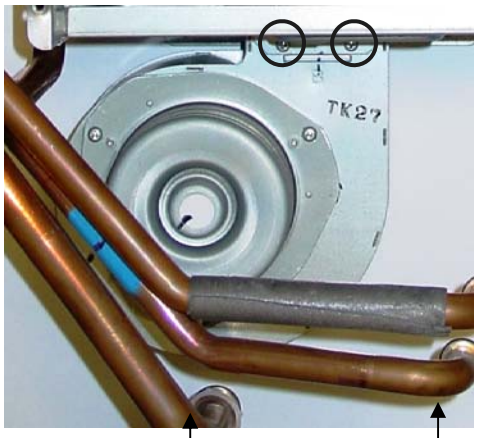


Figure 7

Water outlet tube

Water inlet tubes

Heat Exchanger

R/C98i(ASME), R98LSi(ASME)

28. Connect wire harness attachments:
    A. Thermal fuse connectors (two) at bundle on left side of heat exchanger (WT to WT and RD to RD)
    B. Connect overheat bimetal at upper right heat exchanger.
    C. Heat exchanger thermistor connector at bundle on left side of heat exchanger (WT/WT to WT/PK)
    D. Heating element connectors: water flow servo assembly, hot water outlet, heat exchanger heating elements (at bottom left), frost sensing switch (bottom center).
29. Attach the ignition line at the burner cover plate.
30. Attach the 3 electrical connectors to the solenoid valves.
31. Attach the wire harness to the fan assembly (white, yellow, black, red wires).
32. Attach the brackets to the water line connections. (Figure 2)
33. Install the front panel using 4 screws.
34. Turn on the water supply, power supply, and gas supply.
35. Check for gas leaks.

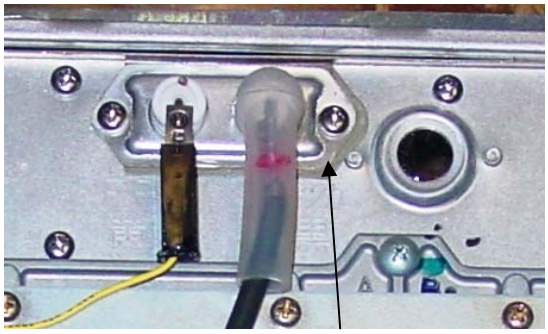


Figure 8 Electrode Gasket

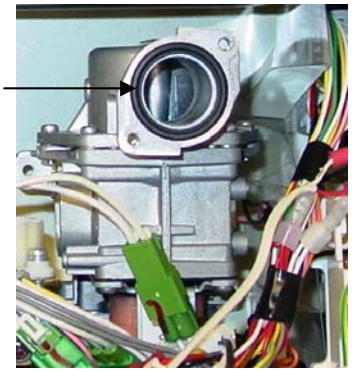


Figure 9

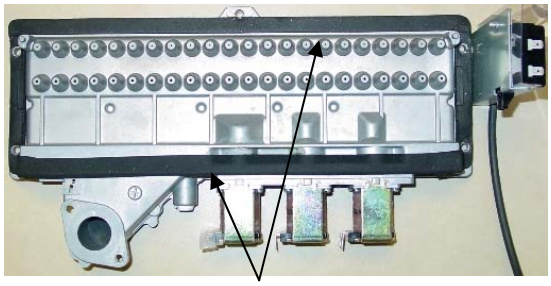


Figure 10 Gaskets

Component Replacement Instructions

Heat Exchanger

RC80HPe

These instructions are for replacing the lower (primary) heat exchanger or the upper (secondary) heat exchanger.

WARNING Failure to correctly assemble the components according to these instructions may result in a gas leak or explosion.

1. Turn off gas supply.
2. Turn off water supply. Drain all water from the appliance.
3. Turn off 120V power supply.
4. Remove four screws securing the front panel. Remove front panel.

Remove gas manifold

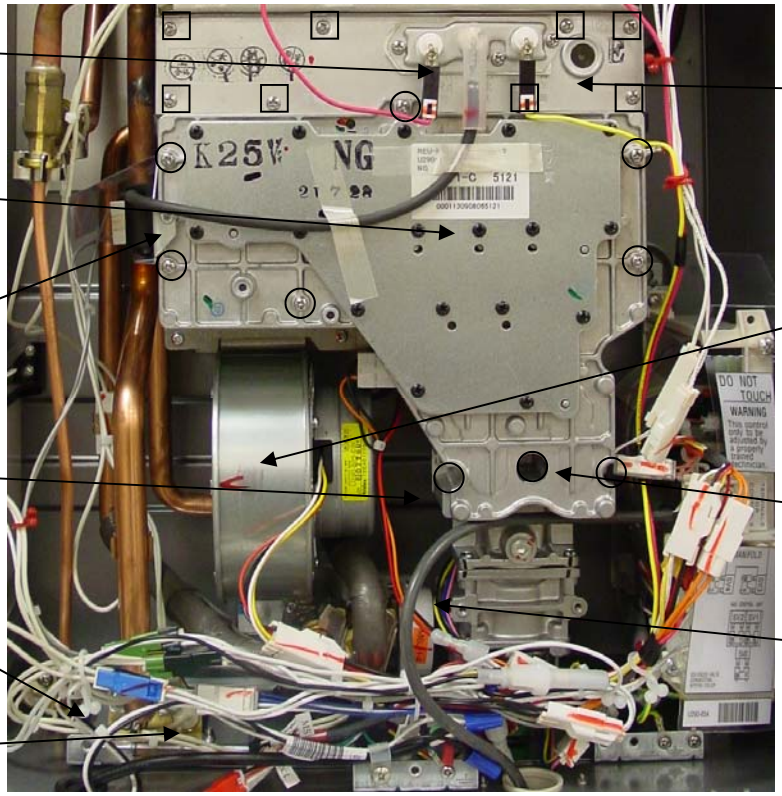
5. Disconnect high tension cord from ignitor.
6. Disconnect flame rod wires. (yellow and red)
7. Remove the three machine screws where manifold meets gas valve. Then remove six screws from manifold.
8. Disconnect ignitor module harness, mounted on manifold. (gray/gray)
9. Disconnect the two solenoid wire harnesses at bottom of manifold. Remove manifold plate.
10. Remove eight screws for the combustion chamber sight glass plate. Remove plate.
11. Remove two screws attaching the burner to the heat exchanger. Pull out the burner.

Remove fan

12. Disconnect fan harness.
13. Remove two screws from fan assembly.
14. Remove fan.

Disconnect water lines

15. Remove one screw from hot water line bracket. Remove bracket by rotating and moving it up toward the bend in the tube where the diameter is smaller.
16. Remove two screws and two brackets at by-pass valve assembly.
17. Remove clips from drain connecting pipe. Remove drain connecting pipe.


Flame Rod Connectors (Step 6)
Manifold (Step 7) ◯
Ignitor (Step 5, 8)
Solenoid connectors (Step 9)
Drain pipe clip (Step 17)
Water outlet (Step 15)
Combustion chamber sight glass plate (Step 10) □
Fan (Steps 12-14)
Machine screws (Step 7) ◯
By-pass valve (Step 16)

18. Disconnect condensate tube from upper heat exchanger.

Disconnect wire harnesses

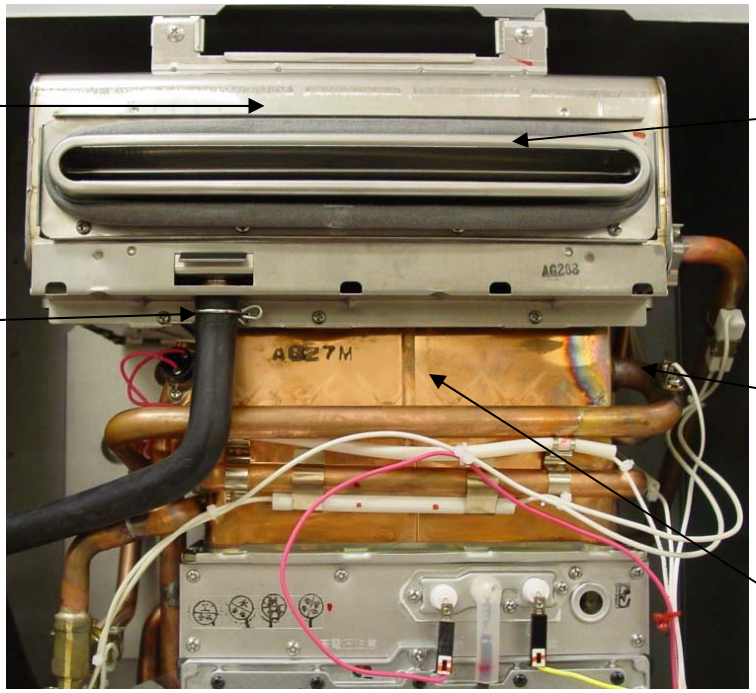
19. Disconnect heat exchanger thermistor (upper right).
20. Disconnect anti frost heater connector at bottom of cabinet. One blue connector.
21. Disconnect thermal fuse harnesses (lower right). Two single white wire connectors.

Remove heat exchanger

22. Remove three screws at bottom of heat exchanger. Remove two screws at top back of heat exchanger. Remove two screws at top on reinforcement bracket for upper heat exchanger.
23. Remove heat exchanger assembly.
24. **If replacing the upper (secondary) heat exchanger,** remove clips from two upper heat exchanger copper pipes. Disconnect pipes. Remove eight screws from flue outlet assembly. Discard screws.
    Remove two screws from reinforcement bracket. Discard screws.
25. Remove three screws on front where upper and lower heat exchangers meet. Discard screws. Turn heat exchanger over; remove six screws on back where upper and lower heat exchangers meet. Discard screws. Separate the upper heat exchanger from the lower heat exchanger.

Installation

26. Install new gasket from kit onto the upper heat exchanger. (Remove the old gasket if the upper heat exchanger is not new.) Attach upper heat exchanger to lower heat exchanger with new screws from kit. (six screws on back, three screw on front)
27. **If replacing lower (primary) heat exchanger,** transfer wiring from old heat exchanger to new heat exchanger. Ensure proper routing of harnesses. These include thermal fuse, bi-metal, heat exchanger thermistor, and ceramic heaters.
28. Transfer parts from old heat exchanger to new heat exchanger.
29. **If replacing the upper (secondary) heat exchanger,** install connecting pipe to upper heat exchanger and copper tee with new o-ring and clip; and connecting pipe between upper heat exchanger and bypass valve with new o-ring and clip.
    Install the flue outlet assembly (8 screws) and the reinforcement bracket (2 screws).


Upper (secondary) heat exchanger
Flue outlet (Step 24)
Condensate tube clip (Step 18)
Thermistor (Step 19)
Lower (primary) heat exchanger

30. Install heat exchanger assembly in case. Place bottom in cabinet first. Attach with five screws. (two at top back and three on bottom). Attach reinforcement bracket with two screws.

Install water and drain lines

31. Install drain connecting pipe with new o-rings and attach with new clips.
32. Attach connecting pipe to by-pass valve with one screw and bracket. Attach other water line with one screw and bracket.
33. Attach the hot water outlet line to the hot water outlet fitting with one screw and bracket. Reconnect condensate tube to upper heat exchanger.

Reconnect wire harness

34. Reconnect heat exchanger thermistor (upper right).
35. Reconnect anti frost connector at bottom of cabinet. One blue connector.
36. Reconnect thermal fuse harnesses (lower right). Two single white wire connectors.

Install burner and burner cover plate

37. Install burner assembly with two screws. Remove combustion chamber packing on sight glass plate. Install new packing, in kit, on sight glass plate. Install combustion chamber sight glass plate with eight screws.

Install fan

38. Reinstall fan with two screws. Install fan connector.

Install gas manifold

39. Remove packing from gas control assembly. Discard. Install new packing, in kit, on gas control assembly.
40. Remove the packing for manifold. Install new packing, in kit, on gas manifold.
41. Reconnect the two solenoid wire harnesses at bottom of manifold.
42. Reconnect ignitor module harness, mounted on manifold. (gray/gray)
43. Attach the gas manifold with three machine screws at the gas control assembly. Install six screws on gas manifold to heat exchanger. Attach wire harness ties.

Reconnect flame rod connectors and igniter

44. Install two flame rod connectors. (marked)
45. Attach ignitor high tension cord to the electrode.
46. Turn on water supply, power supply, and gas supply. Check for gas and water leaks. Perform operational checks.
47. Install the front panel using four screws.

Component Replacement Instructions

Heat Exchanger

RC80HPi

These instructions are for replacing the lower (primary) heat exchanger or the upper (secondary) heat exchanger.

⚠ WARNING Failure to correctly assemble the components according to these instructions may result in a gas leak or explosion.

1. Turn off gas supply.
2. Turn off water supply. Drain all water from the appliance.
3. Turn off 120V power supply.
4. Remove four screws securing the front panel. Remove front panel.

Remove controller assembly

5. Remove temperature controller. Remove two screws for temperature controller bracket. Remove bracket.

Remove gas manifold

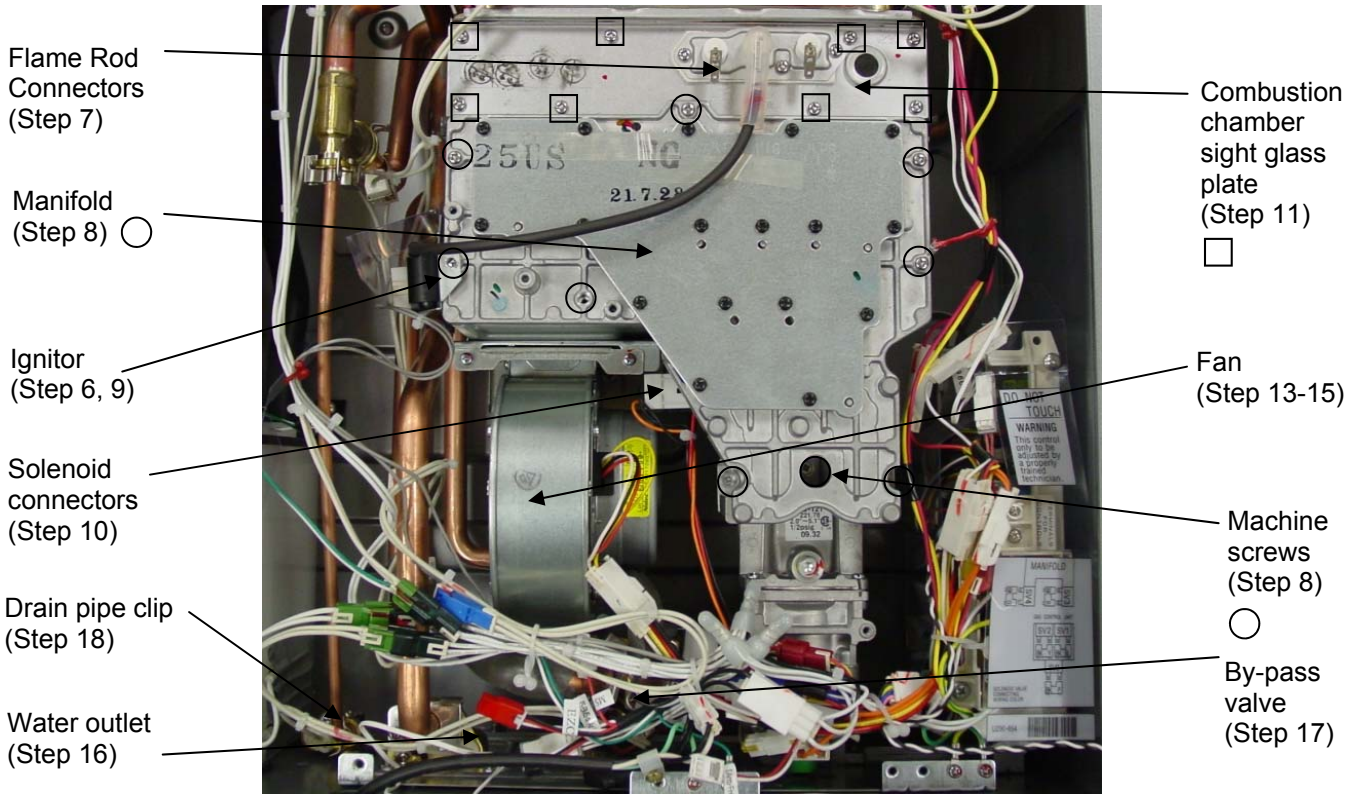
6. Disconnect high tension cord from ignitor.
7. Disconnect flame rod wires. (yellow and red)
8. Remove three machine screws where manifold meets the gas valve, then remove six screws from the manifold.
9. Disconnect ignitor module harness, mounted on manifold. (gray/gray)
10. Disconnect the two solenoid wire harnesses at bottom of manifold. Remove manifold plate.
11. Remove eight screws for the combustion chamber sight glass plate. Remove plate.
12. Remove two screws attaching the burner to the heat exchanger. Pull out the burner.

Remove fan

13. Disconnect fan harness.
14. Remove two screws from fan assembly.
15. Remove fan.

Disconnect water lines

16. Remove one screw from hot water line bracket. Remove bracket by rotating and moving it up toward the bend in the tube where the diameter is smaller.
17. Remove two screws and two brackets at by-pass valve assembly.
18. Remove clips from drain connecting pipe. Remove drain connecting pipe.


Flame Rod Connectors (Step 7)
Manifold (Step 8) ◯
Ignitor (Step 6, 9)
Solenoid connectors (Step 10)
Drain pipe clip (Step 18)
Water outlet (Step 16)
Combustion chamber sight glass plate (Step 11) □
Fan (Step 13-15)
Machine screws (Step 8) ◯
By-pass valve (Step 17)

19. Disconnect condensate tube from upper heat exchanger.

Disconnect wire harnesses

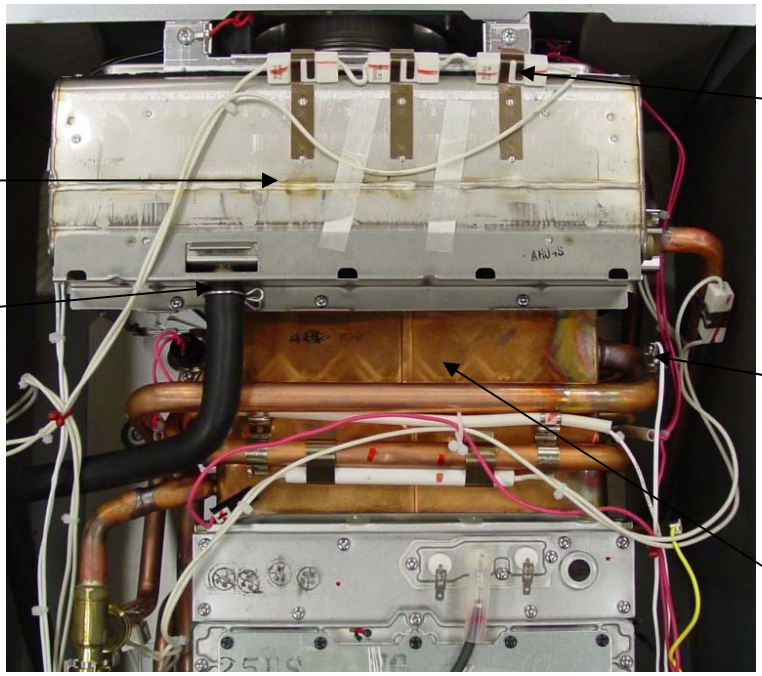
20. Disconnect heat exchanger thermistor (upper right).
21. Remove three anti frost heaters from clips at top of heat exchanger.
22. Disconnect anti frost heater connectors at bottom of cabinet. One blue connector.
23. Disconnect burner sensor harness (lower right).
24. Disconnect thermal fuse harnesses (lower right). Two single white wire connectors.

Remove heat exchanger

25. Remove three screws at bottom of heat exchanger. Remove two screws at top back of heat exchanger. Remove two screws at top on reinforcement bracket for upper heat exchanger.
26. Remove four screws for flue connection assembly. Remove flue connection.
27. Remove heat exchanger assembly.
28. Remove clips and connecting pipe between upper heat exchanger and copper tee on left side.
29. Remove three screws on front where upper and lower heat exchangers meet. Discard screws. Turn heat exchanger over; remove six screws on back where upper and lower heat exchangers meet. Discard screws. Separate the upper heat exchanger from the lower heat exchanger.
30. **If replacing the upper (secondary) heat exchanger,** then remove fourteen screws to separate it from the air inlet box assembly. Discard screws and remove air inlet box assembly. Remove the old gasket from the air inlet box assembly. Install new gasket from kit. Attach air inlet box assembly with new screws (fourteen) from kit. Ensure reinstallation of reinforcement bracket on top of air inlet box assembly.

Installation

31. Install new gasket from kit onto the upper heat exchanger. (Remove the old gasket if the upper heat exchanger is not new.) Attach upper heat exchanger to new lower heat exchanger with new screws from kit. (six screws on back, three screw on front)
32. **If replacing the lower (primary) heat exchanger,** transfer wiring from old heat exchanger to new heat exchanger. Ensure proper routing of harnesses. These include burner sensor with new gasket, thermal fuse, bi-metal, ceramic heaters.


Upper (secondary) heat exchanger
Condensate tube clip (Step 19)
Anti frost heaters/clips (Step 21)
Thermistor (Step 20)
Lower (primary) heat exchanger

33. **If replacing the lower (primary) heat exchanger,** transfer parts from old heat exchanger to new heat exchanger. These include connecting pipe between upper heat exchanger and copper tee with new o-rings and clips, connecting pipe between upper heat exchanger and bypass valve with new o-ring and clip.
34. Install heat exchanger assembly in case. Place bottom in cabinet first. Attach with five screws. (two at top back and three on bottom) Attach reinforcement bracket with two screws.
35. Remove old gasket from flue connection assembly. Install new gasket from kit. Attach flue connections assembly with four screws.

Install water and drain lines

36. Install drain connecting pipe with new o-rings and attach with new clips.
37. Attach water inlet connecting pipe with new o-rings at by-pass valve with one screw and bracket. Attach other water line with one screw and bracket.
38. Attach the hot water outlet line to the hot water outlet fitting with one screw and bracket. Reconnect condensate tube at upper heat exchanger.

Reconnect wire harness

39. Reconnect heat exchanger thermistor (upper right).
40. Install three anti frost heaters in clips at top of upper heat exchanger.
41. Reconnect anti frost connectors at bottom of cabinet. One blue connector.
42. Reconnect burner sensor harness (lower right).
43. Reconnect thermal fuse harnesses (lower right). Two single white wire connectors.

Install burner and burner cover plate

44. Install burner assembly with two screws. Remove combustion chamber packing on sight glass plate. Install new packing, in kit, on sight glass plate. Install combustion chamber sight glass plate with eight screws.

Install fan

45. Reinstall fan with two screws. Install fan connector.

Install gas manifold

46. Remove packing from gas control assembly. Discard. Install new packing, in kit, on gas control assembly.
47. Remove the packing for manifold. Install new packing, in kit, on gas manifold.
48. Reconnect ignitor module harness, mounted on manifold. (gray/gray)
49. Install two connectors to the solenoids on the gas manifold. (marked)
50. Attach the gas manifold with three machine screws at the gas control assembly. Install six screws on gas manifold to heat exchanger. Attach wire harness ties.

Reconnect flame rod connectors and igniter

51. Install two flame rod connectors. (marked)
52. Attach ignitor high tension cord to the electrode.
53. Attach controller bracket with one machine screw and one screw from power wire clamp. Install controller in bracket.
54. Turn on water supply, power supply, and gas supply. Check for gas and water leaks. Perform operational checks.
55. Install the front panel using four screws.

Component Replacement Instructions

Heat Exchanger

RC98HPe

These instructions are for replacing the lower (primary) heat exchanger or the upper (secondary) heat exchanger.

WARNING Failure to correctly assemble the components according to these instructions may result in a gas leak or explosion.

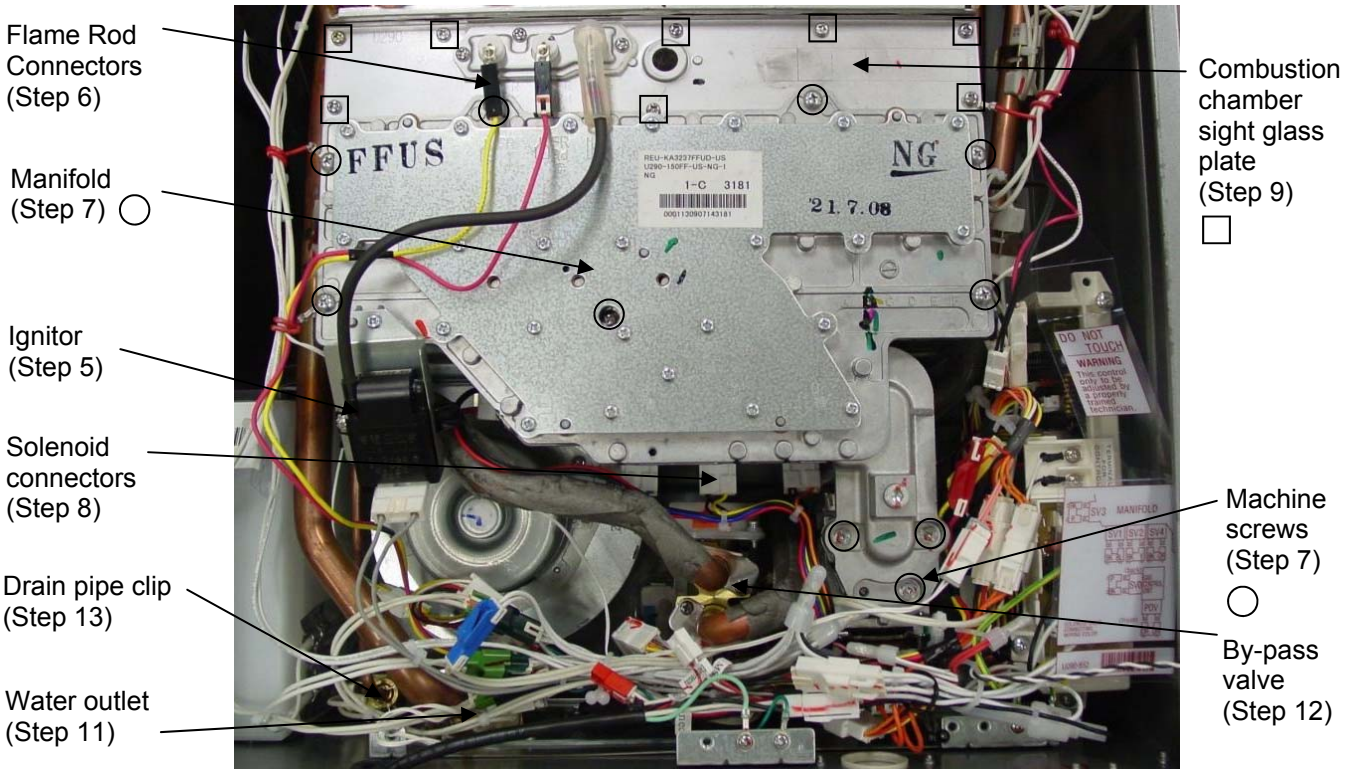
1. Turn off gas supply.
2. Turn off water supply. Drain all water from the appliance.
3. Turn off 120V power supply.
4. Remove four screws securing the front panel. Remove front panel.

Remove gas manifold

5. Disconnect high tension cord from ignitor. Remove one screw for ignitor bracket. Remove ignitor bracket from manifold.
6. Disconnect flame rod connectors. (yellow and red)
7. Remove seven pan head screws from manifold (six screws on the outer edge, one screw in middle), and three machine screws, at bottom of manifold, to gas valve.
8. Disconnect the four connectors from the solenoids at bottom of manifold. Remove manifold plate.
9. Remove eight screws for the combustion chamber sight glass plate. Remove plate.
10. Remove two screws attaching the burner to the heat exchanger. Pull out the burner.

Disconnect water lines

11. Remove one screw from hot water line bracket. Remove bracket by rotating and moving it up toward the bend in the tube where the diameter is smaller.
12. Remove two screws and two brackets at by-pass valve assembly.
13. Remove lower clip from drain connecting pipe.
14. Remove the clip on the heat exchanger inlet pipe on the right side of heat exchanger. Remove the two anti frost heaters from pipe. Remove heat exchanger inlet pipe.
15. Disconnect condensate tube from upper heat exchanger.



Heat Exchanger

RC98HPe

Disconnect wire harnesses

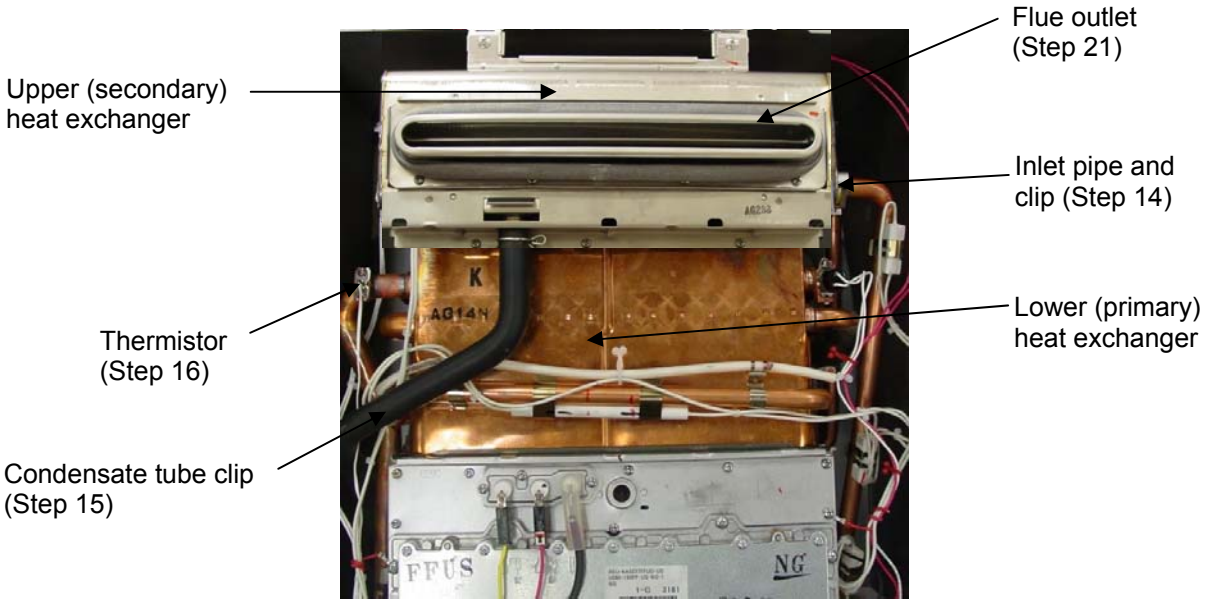
16. Disconnect heat exchanger thermistor (upper right).
17. Disconnect anti frost heater connector at bottom of cabinet. One blue and one green connector.
18. Disconnect thermal fuse harnesses (lower right). Single white wire connectors and single red wire connector.

Remove heat exchanger

19. Remove two screws at bottom of heat exchanger. Remove two screws at top back of heat exchanger. Remove two screws at top on reinforcement bracket for upper heat exchanger. Upper frost sensing switch is secured on reinforcement bracket—set aside.
20. Remove heat exchanger assembly.
21. **If replacing the upper (secondary) heat exchanger,** remove clips from two upper heat exchanger copper pipes. Disconnect pipes. Remove eight screws from flue outlet assembly. Discard screws.
    Remove two screws from reinforcement bracket. Discard screws.
22. Remove three screws on front where upper and lower heat exchangers meet. Discard screws. Turn heat exchanger over; remove six screws on back where upper and lower heat exchangers meet. Discard screws. Separate the upper heat exchanger from the lower heat exchanger.

Installation

23. Install new gasket from kit onto the upper heat exchanger. (Remove the old gasket if the upper heat exchanger is not new.) Attach upper heat exchanger to lower heat exchanger with new screws from kit. (six screws on back, three screw on front)
24. **If replacing the lower (primary) heat exchanger,** transfer wiring from old heat exchanger to new heat exchanger. Ensure proper routing of harnesses. These include thermal fuse, bi-metal, ceramic heaters.
25. Transfer parts from old heat exchanger to new heat exchanger.
26. **If replacing the upper (secondary) heat exchanger,** install connecting pipe to upper heat exchanger and copper tee with new o-ring and clip; and connecting pipe between upper heat exchanger and bypass valve with new o-ring and clip.
    Install the flue outlet assembly (8 screws) and the reinforcement bracket (2 screws).



27. Install heat exchanger assembly in case. Place bottom in cabinet first. Attach with four screws. (two at top back and two on bottom). Install reinforcement bracket with two screws. Ensure the frost sensing switch is installed.

Install water and drain lines

28. Install drain connecting pipe with new o-rings and attach with new clips.
29. Attach connecting pipe to by-pass valve with one screw and bracket. Attach other water line with one screw and bracket.
30. Attach the hot water outlet line to the hot water outlet fitting with one screw and bracket. Reconnect condensate tube to upper heat exchanger.

Reconnect wire harness

31. Reconnect heat exchanger thermistor (upper left).
32. Reconnect anti frost connector at bottom of cabinet. One blue and one green connector.
33. Reconnect thermal fuse harnesses (lower right). Single white wire connectors and single red wire connector.

Install burner and burner cover plate

34. Install burner assembly with two screws. Remove combustion chamber packing on sight glass plate. Install new packing, in kit, on sight glass plate. Install combustion chamber sight glass plate with eight screws.

Install gas manifold

35. Remove packing from gas control assembly. Discard. Install new packing, in kit, on gas control assembly.
36. Remove the packing for manifold. Install new packing, in kit, on gas manifold.
37. Reconnect the four connectors at bottom of manifold.
38. Attach the gas manifold with three machine screws at the gas control assembly. Install seven screws on gas manifold to heat exchanger. Attach wire harness ties.

Reconnect flame rod connectors and igniter

39. Install two flame rod connectors. (marked)
40. Install ignitor bracket with one machine screw.
41. Attach ignitor high tension cord to the electrode.
42. Turn on water supply, power supply, and gas supply. Check for gas and water leaks. Perform operational checks.
43. Install the front panel using four screws.

Component Replacement Instructions

Heat Exchanger

RC98HPi

These instructions are for replacing the lower (primary) heat exchanger or the upper (secondary) heat exchanger.

⚠ WARNING Failure to correctly assemble the components according to these instructions may result in a gas leak or explosion.

1. Turn off gas supply.
2. Turn off water supply. Drain all water from the appliance.
3. Turn off 120V power supply.
4. Remove four screws securing the front panel. Remove front panel.

Remove controller assembly

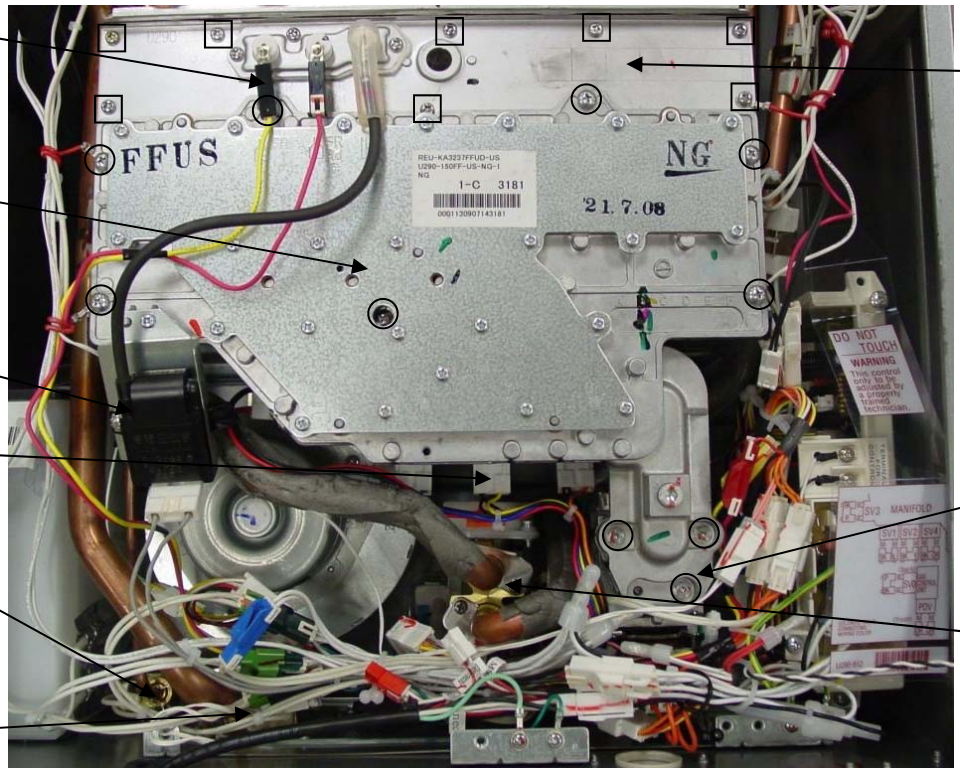
5. Remove temperature controller. Remove two screws for temperature controller bracket. Remove bracket.

Remove gas manifold

6. Remove high tension cord from ignitor. Remove one screw for ignitor bracket. Remove ignitor bracket from manifold.
7. Remove red and yellow flame rod connectors.
8. Remove seven pan head screws from manifold. (Six screws on outer edge, one screw in middle and three machine screws from bottom of manifold to gas valve.)
9. Remove four connectors from the solenoids at the bottom of the manifold. Remove manifold.
10. Remove eight screws for the combustion chamber sight glass plate. Remove plate.
11. Remove two screws attaching the burner to the heat exchanger. Pull out the burner.

Disconnect water lines

12. Remove one screw from hot water line bracket. Remove bracket by rotating and moving it up toward the bend in the tube where the diameter is smaller.
13. Remove two screws and two brackets at by-pass valve assembly.
14. Remove lower clip from drain connecting pipe.



15. Remove the clip on the heat exchanger inlet pipe on right side of heat exchanger. Remove the two anti frost heaters from pipe. Remove heat exchanger inlet pipe.
16. Disconnect condensate tube from upper heat exchanger.

Disconnect wire harness

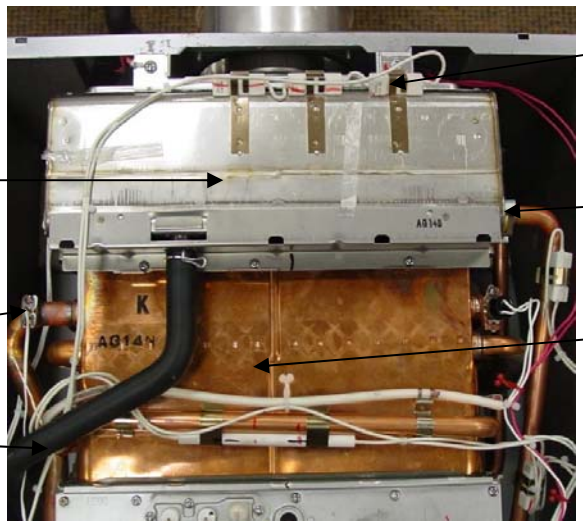
17. Disconnect heat exchanger thermistor (upper left).
18. Remove three anti frost heaters from clips at top of heat exchanger.
19. Disconnect anti frost heater connectors at bottom of cabinet. (one green connector with cables leading to the right side, one blue connector.)
20. Disconnect burner sensor harness (lower right).
21. Disconnect thermal fuse harnesses (lower right). Single white wire connector, single red wire connector.
22. Disconnect fan connector.

Remove heat exchanger

23. Remove two screws at bottom of heat exchanger. Remove two screws at top back of heat exchanger. Remove two screws at top on reinforcement bracket for upper heat exchanger. Upper frost sensing switch is secured on reinforcement bracket, set aside.
24. Remove four screws for flue connection assembly. Remove flue connection.
25. Remove heat exchanger assembly.
26. Remove anti frost heater from connecting pipe between upper heat exchanger and copper tee on left side. Remove clips and connecting pipe.
27. Remove three screws on front, where upper and lower heat exchangers meet. Discard screws. Turn heat exchanger over; remove six screws on back where upper and lower heat exchangers meet. Discard screws. Separate the upper heat exchanger from the lower heat exchanger.
28. **If replacing the upper (secondary) heat exchanger,** then remove fourteen screws to separate it from the air inlet box assembly. Discard screws and remove air inlet box assembly. Remove the old gasket from the air inlet box assembly. Install new gasket from kit. Attach air inlet box assembly with new screws (fourteen) from kit. Ensure reinstallation of reinforcement bracket on top of air inlet box assembly.

Installation

29. Install new gasket from kit onto the upper heat exchanger. (Remove the old gasket if the upper heat exchanger is not new.) Attach upper heat exchanger to the lower heat exchanger with new screws from kit. (six screws on back, three screw on front)
30. **If replacing the lower (primary) heat exchanger,** transfer wiring from old heat exchanger to new heat exchanger. Ensure proper routing of harnesses. These include burner sensor with new gasket, thermal fuse, bi-metal, ceramic heaters.


Anti frost heaters/clips (Step 18)
Upper (secondary) heat exchanger
Inlet pipe clip (Step 15)
Thermistor (Step 17)
Lower (primary) heat exchanger
Condensate tube clip (Step 16)

31. **If replacing the lower (primary) heat exchanger,** transfer parts from old heat exchanger to new heat exchanger. These include fan housing assembly, connecting pipe to upper heat exchanger and copper tee with new o-ring and clip, drain pipe from copper tee.
32. Install heat exchanger assembly in case. Place bottom in cabinet first. Attach with four screws. (two at top back and two on bottom) Attach reinforcement bracket with two screws.
33. Remove old gasket from flue connection assembly. Install new gasket from kit. Attach flue connections assembly with four screws.

Install water and drain lines

34. Install drain connecting pipe with new o-rings and attach with new clips.
35. Install water inlet connecting pipe with new o-rings to upper heat exchanger. Attach with new clip at heat exchanger and at bottom to the by-pass valve with one screw and bracket. Attach the other water line with one screw and bracket.
36. Attach the hot water outlet line to the hot water outlet fitting with one screw and bracket. Reconnect condensate tube to upper heat exchanger.

Reconnect wire harness

37. Reconnect heat exchanger thermistor (upper left).
38. Install three anti frost heaters in clips at top of upper heat exchanger.
39. Reconnect anti frost connectors at bottom of cabinet. One green connector, one blue connector.
40. Reconnect burner sensor harness (lower right).
41. Reconnect thermal fuse harnesses (lower right). Single white wire connector, single red wire connector.
42. Reconnect the fan connector.

Install burner and burner cover plate

43. Install burner assembly with two screws. Replace combustion chamber packing (in kit) on sight glass plate. Install combustion chamber sight glass plate with eight screws.

Install gas manifold

44. Remove packing from gas control assembly. Discard. Install new packing, in kit, on gas control assembly.
45. Remove the packing for manifold. Install new packing, in kit, on gas manifold.
46. Attach the gas manifold with three machine screws at the gas control assembly. Install seven pan head screws on gas manifold to heat exchanger. Attach wire harness ties. (six screws at outer edge, one middle of gas manifold plate)
47. Install four connectors to the solenoids on the gas manifold. (marked)

Reconnect flame rod connectors and igniter

48. Install two flame rod connectors. (marked)
49. Install ignitor bracket with one machine screw.
50. Attach ignitor high tension cord to the electrode.
51. Attach controller bracket with one machine screw and one screw from power wire clamp. Install controller in bracket.

Check

52. Turn on water supply, power supply, and gas supply. Check for gas and water leaks. Perform operational checks.
53. Install the front panel using four screws.

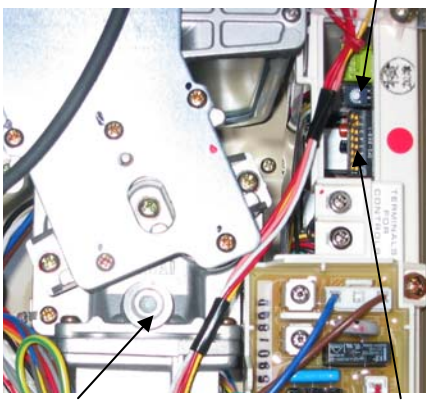
Gas Pressure Setting Procedure

⚠ CAUTION

Do not touch the areas at or near the heat exchanger or combustion chamber. These areas become very hot and could cause burns.

1. Remove the front panel (four screws).
2. Calibrate the low fire and high fire settings as follows:
   A. Remove the allen head plug and attach the manometer to the burner test point located on the gas control. (Figure 1-5)

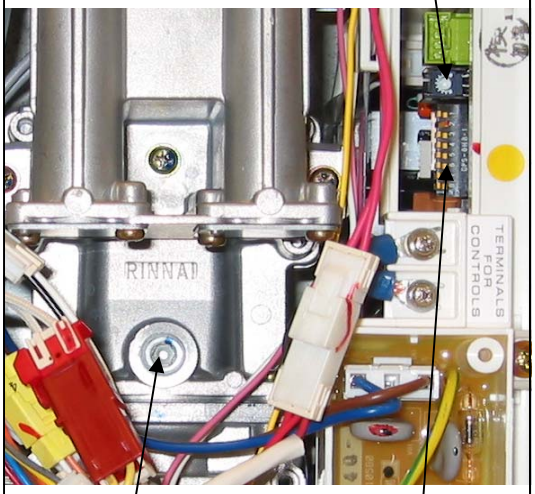
Figure 1 Potentiometer (POT)



Burner test point Dip switches (SW1)

Models R/C42e, R/C53e, V53e, R63LSe

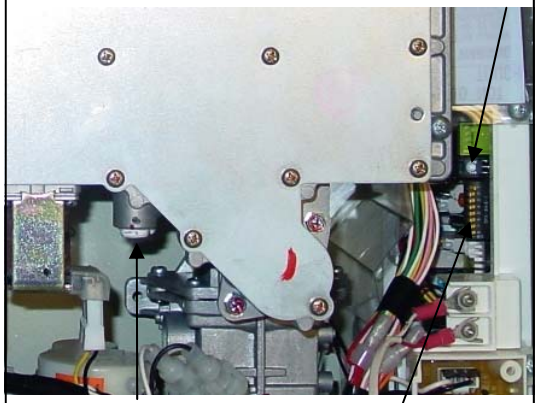
Figure 2 Potentiometer (POT)



Burner test point Dip switches (SW1)

Models R70e, R75LSe, R/C85e, R94LSe, R50LSi, R/C53i, R75LSi, R/C85i, R94LSi

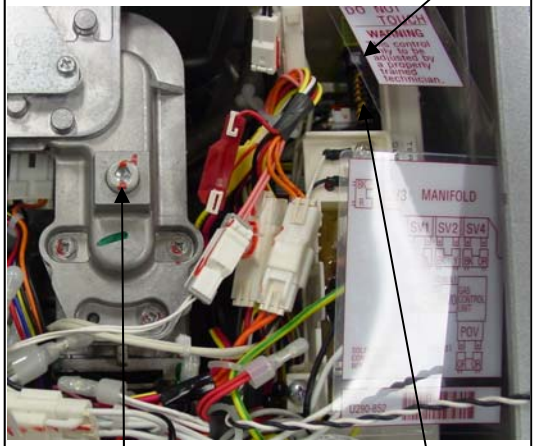
Figure 3 Potentiometer (POT)



Burner test point Dip switches (SW1)

Models R/C98e, R98LSe, R/C98i, R98LSi

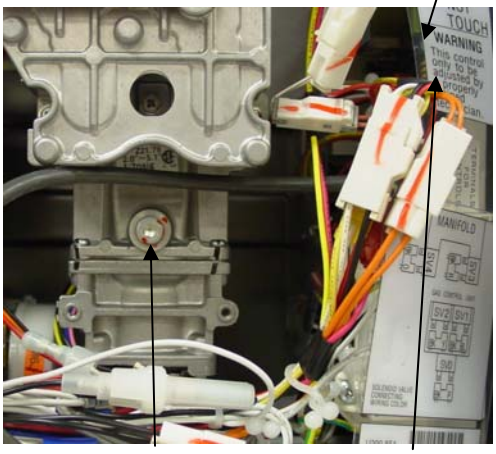
Figure 4 Potentiometer (POT)



Burner test point Dip switches (SW1)

Models RC98HPe, RC98HPi

Figure 5 Potentiometer (POT)



Burner test point Dip switches (SW1)

Models RC80HPe, RC80HPi

B. Turn on the gas supply.

C. Turn on the power supply.

D. Flow water through the water heater at the maximum flow rate obtainable. (At least 3 gallons per minute is recommended. If there is not enough water flowing, the water heater could shut off or sustain damage due to overheating.)

E. Move No. 7 dip switch of the SW1 bank to the ON position to calibrate “Forced Low” combustion. (Figure 5)

F. Check the burner test point pressure.

G. Remove the rubber access plug (Figure 4) and adjust the regulator screw on the modulating valve to obtain the correct low fire manifold pressure. Refer to the Manifold Gas Pressure Settings section, page 101-105. Install rubber access plug.

H. Move No. 7 and No. 8 dip switches of the SW1 bank to the ON position to calibrate “Forced High” combustion. (Figure 6)

I. Check the burner test point pressure.

J. Adjust the high pressure Potentiometer (POT) (Figure 1-5) on the PC Board to obtain the correct high fire manifold pressure. Refer to the Manifold Gas Pressure Settings section, page 101-105.

K. Move No. 7 and No. 8 back to the OFF position to return the appliance to “Normal” combustion. (Figure 7)

L. Close hot water taps.

M. Turn off gas supply and 120 V power supply.

N. Remove manometer and re-install allen head plug.

O. Turn on the gas supply and 120 V power supply.

P. Operate the unit and check for gas leaks.

3. Install the front panel using four screws.

Figure 4

Access plug

Figure 5

Forced Low

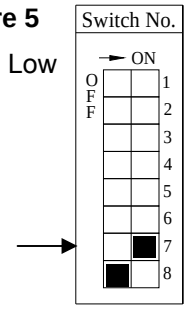


Figure 6

Forced High

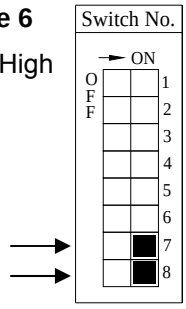
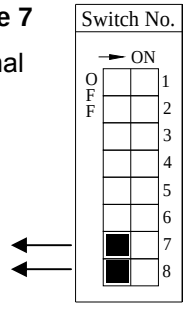


Figure 7

Normal



Manifold Gas Pressure Settings

V Series - Outdoor

Natural Gas

R42e,C42e

Altitude	High Fire	Low Fire
less than 5000 ft (1524 m)	3.5	0.73
6000 ft (1829 m)	3.4	0.71
7000 ft (2134 m)	3.3	0.69
8000-10000 ft	3.2	0.67

R53e,C53e

Altitude	High Fire	Low Fire
less than 2000 ft	3.7	0.74
3000 ft (914 m)	3.5	0.71
4000 ft (1219 m)	3.4	0.68
5000-10000 ft	3.2	0.64

R85e(PLUS), C85e(PLUS)

Altitude	High Fire	Low Fire
less than 10000 ft	3.4	0.56

R70e

Altitude	High Fire	Low Fire
less than 10000 ft (3048 m)	3.4	0.56

R98e(ASME), C98e(ASME)

Altitude	High Fire	Low Fire
less than 2000 ft (610 m)	2.8	0.66
3000 ft (914 m)	2.7	0.63
4000 ft (1219 m)	2.6	0.60
5000 ft (1524 m)	2.4	0.57
6000 ft (1829 m)	2.3	0.54
7000 ft (2134 m)	2.2	0.52
8000-10000 ft (2438 - 3048 m)	2.1	0.50

Propane Gas

Altitude	High Fire	Low Fire
less than 2000 ft (610 m)	3.3	0.72
3000 ft (914 m)	3.0	0.65
4000 ft (1219 m)	2.7	0.58
5000 ft (1524 m)	2.3	0.50

Altitude	High Fire	Low Fire
less than 2000 ft	3.5	0.74

Altitude	High Fire	Low Fire
less than 2000 ft (610 m)	5.1	0.88
3000 ft (914 m)	4.8	0.83
4000 ft (1219 m)	4.5	0.78
5000 ft (1524 m)	4.3	0.73
6000 ft (1829 m)	4.2	0.72
7000-10000 ft (2134 - 3048 m)	4.1	0.71

Altitude	High Fire	Low Fire
less than 10000 ft (3048 m)	5.1	0.88

Altitude	High Fire	Low Fire
less than 2000 ft (610 m)	3.8	0.80
3000 ft (914 m)	3.6	0.75
4000 ft (1219 m)	3.3	0.69
5000 ft (1524 m)	3.1	0.64
6000-10000 ft (1829 - 3048 m)	3.0	0.63

Manifold Gas Pressure Settings

V Series - Indoor

Natural Gas

R53i(PLUS), C53i(PLUS), R85i(PLUS), C85i(PLUS)

Altitude	High Fire	Low Fire
less than 10000 ft (3048 m)	3.7	0.77

R98i(ASME), C98i(ASME)

Altitude	High Fire	Low Fire
less than 2000 ft (610 m)	3.0	0.67
3000 ft (914 m)	2.8	0.64
4000 ft (1219 m)	2.7	0.60
5000-10000 ft (1524 - 3048 m)	2.5	0.56

Propane Gas

Altitude	High Fire	Low Fire
less than 2000 ft (610 m)	4.2	0.93
3000 ft (914 m)	4.0	0.90
4000 ft (1219 m)	3.9	0.86
5000 ft (1524 m)	3.7	0.82
6000 ft (1829 m)	3.7	0.82
7000 ft (2134 m)	3.6	0.80
8000 ft (2438 m)	3.6	0.80
9000 ft (2743 m)	3.4	0.79
10000 ft (3048 m)	3.2	0.75

Altitude	High Fire	Low Fire
less than 2000 ft (610 m)	3.7	0.83
3000 ft (914 m)	3.5	0.78
4000 ft (1219 m)	3.3	0.73
5000 ft (1524 m)	3.0	0.67

VA Models

Dip Switch Setting	Altitude	Natural Gas (Gaz Naturel)				Propane Gas (Gaz propane)			
		MAX VENT Dip Switch #1 is OFF		MIN VENT Dip Switch #1 is ON		MAX VENT Dip Switch #1 is OFF		MIN VENT Dip Switch #1 is ON	
		Max Rate inches W.C.	Min Rate inches W.C.	Max Rate inches W.C.	Min Rate inches W.C.	Max Rate inches W.C.	Min Rate inches W.C.	Max Rate inches W.C.	Min Rate inches W.C.
R50LSi (REU-VA2019FFU)									
#2 OFF, #3 OFF	0-2000 ft (0-610 m)	2.0	0.52	2.0	0.52	3.2	0.92	3.2	0.92
#2 OFF, #3 ON	2001-5200 ft (610-1585 m)	1.7	0.7	1.8	0.7	3.1	1.0	3.0	1.1
#2 ON, #3 OFF	5201-7700 ft (1585-2277 m)	1.7	0.7	1.7	0.7	2.8	0.9	2.8	1.1
#2 ON, #3 ON	7701-10200 ft (2277-3109 m)	1.8	0.9	1.8	0.9	2.8	1.1	2.8	1.4
R75LSi (REU-VA2528FFU-US)									
#2 OFF, #3 OFF	0-2000 ft (0-610 m)	3.3	0.52	3.3	0.52	5.0	0.92	5.0	0.92
#2 OFF, #3 ON	2001-5200 ft (610-1585 m)	2.8	0.5	2.8	0.6	3.3	1.0	3.4	1.0
#2 ON, #3 OFF	5201-7700 ft (1585-2277 m)	2.4	0.5	2.4	0.5	3.4	1.1	3.4	1.2
#2 ON, #3 ON	7701-10200 ft (2277-3109 m)	2.1	0.5	2.1	0.5	3.2	1.1	3.2	1.1
R75LSi(A) (REU-VA2528FFU(A)-US) (REU-VA2528FFU(A)-UC)									
#2 OFF, #3 OFF	0-2000 ft (0-610 m)	2.7	0.52	2.7	0.52	4.4	0.92	4.4	0.92
#2 OFF, #3 ON	2001-5200 ft (610-1585 m)	2.8	0.5	2.8	0.5	3.3	1.0	3.4	1.0
#2 ON, #3 OFF	5201-7700 ft (1585-2277 m)	2.4	0.5	2.4	0.5	3.4	1.1	3.4	1.2
#2 ON, #3 ON	7701-10200 ft (2277-3109 m)	2.1	0.5	2.1	0.5	3.2	1.1	3.2	1.1
R94LSi (REU-VA2535FFU-US) (REU-VA2535FFU-UC)									
#2 OFF, #3 OFF	0-2000 ft (0-610 m)	3.3	0.52	3.3	0.52	5.0	0.92	5.0	0.92
#2 OFF, #3 ON	2001-5200 ft (610-1585 m)	2.8	0.5	2.8	0.6	3.3	1.0	3.4	1.0
#2 ON, #3 OFF	5201-7700 ft (1585-2277 m)	2.4	0.5	2.4	0.5	3.4	1.1	3.4	1.2
#2 ON, #3 ON	7701-10200 ft (2277-3109 m)	2.1	0.5	2.1	0.5	3.2	1.1	3.2	1.1
R98LSi (REU-VA3237FFU)									
		3.0	0.67	3.0	0.67	3.7	0.83	3.7	0.83
		2.7	0.7	2.7	0.7	2.9	0.83	2.9	0.83
		2.7	0.8	2.7	0.8	3.0	0.83	3.0	0.9
		2.5	1.7	2.5	1.2	2.8	0.83	2.8	1.2

VA Models

Dip Switch Setting	Altitude	**Natural Gas** (Gaz Naturel)		**Propane Gas (**Gaz propane)	
		Max Rate inches W.C.	**Min Rate** inches W.C.	**Max Rate** inches W.C.	**Min Rate** inches W.C.
V53e (REU-VAM1620W)					
#2 OFF, #3 OFF	0-2000 ft (0-610 m)	2.5	0.73	2.4	0.75
#2 OFF, #3 ON	2001-5200 ft (610-1585 m)	2.4	0.7	2.2	0.9
#2 ON, #3 OFF	5201-7700 ft (1585-2277 m)	2.4	0.7	2.0	0.8
#2 ON, #3 ON	7701-10200 ft (2277-3109 m)	2.4	0.9	2.0	0.7
R63LSe (REU-VA2024W)					
#2 OFF, #3 OFF	0-2000 ft (0-610 m)	1.7	0.53	2.4	0.61
#2 OFF, #3 ON	2001-5200 ft (610-1585 m)	1.6	0.4	2.0	0.7
#2 ON, #3 OFF	5201-7700 ft (1585-2277 m)	1.5	0.5	2.0	0.7
#2 ON, #3 ON	7701-10200 ft (2277-3109 m)	1.5	0.5	1.8	0.8
R63LSe2 (REU-VA2024W(A)-US)					
#2 OFF, #3 OFF	0-2000 ft (0-610 m)	2.0	0.56	3.0	0.88
#2 OFF, #3 ON	2001-5200 ft (610-1585 m)	1.7	0.55	2.8	0.90
#2 ON, #3 OFF	5201-7700 ft (1585-2277 m)	1.7	0.70	2.7	1.00
#2 ON, #3 ON	7701-10200 ft (2277-3109 m)	1.5	0.70	2.7	0.80

VA Models

Dip Switch Setting	Altitude	**Natural Gas** (Gaz Naturel)		**Propane Gas (**Gaz propane)	
		Max Rate inches W.C.	**Min Rate** inches W.C.	**Max Rate** inches W.C.	**Min Rate** inches W.C.
R75LSe (REU-VA2528W-US)					
#2 OFF, #3 OFF	0-2000 ft (0-610 m)	3.3	0.56	5.0	0.88
#2 OFF, #3 ON	2001-5200 ft (610-1585 m)	3.3	0.7	4.0	1.1
#2 ON, #3 OFF	5201-7700 ft (1585-2277 m)	3.3	0.9	4.0	0.9
#2 ON, #3 ON	7701-10200 ft (2277-3109 m)	3.1	0.7	4.0	0.9
R75LSe(A) (REU-VA2528W(A)-US) (REU-VA2528W(A)-UC)					
#2 OFF, #3 OFF	0-2000 ft (0-610 m)	2.9	0.56	4.2	0.88
#2 OFF, #3 ON	2001-5200 ft (610-1585 m)	3.3	0.7	4.0	1.1
#2 ON, #3 OFF	5201-7700 ft (1585-2277 m)	3.3	0.9	4.0	0.9
#2 ON, #3 ON	7701-10200 ft (2277-3109 m)	3.1	0.7	4.0	0.9
R94LSe (REU-VA2535W-US) (REU-VA2535W-UC)					
#2 OFF, #3 OFF	0-2000 ft (0-610 m)	3.3	0.56	5.1	0.88
#2 OFF, #3 ON	2001-5200 ft (610-1585 m)	3.3	0.7	4.0	1.1
#2 ON, #3 OFF	5201-7700 ft (1585-2277 m)	3.3	0.9	4.0	0.9
#2 ON, #3 ON	7701-10200 ft (2277-3109 m)	3.1	0.7	4.0	0.9
R98LSe (REU-VA3237W)					
#2 OFF, #3 OFF	0-2000 ft (0-610 m)	2.8	0.65	3.8	0.80
#2 OFF, #3 ON	2001-5200 ft (610-1585 m)	2.5	0.7	3.0	0.80
#2 ON, #3 OFF	5201-7700 ft (1585-2277 m)	2.5	0.7	3.0	0.80
#2 ON, #3 ON	7701-10200 ft (2277-3109 m)	2.5	0.7	3.0	0.80

VB Models

Dip Switch Setting	Altitude	**Natural Gas** (Gaz Naturel)		**Propane Gas (**Gaz propane)	
		Max Rate inches W.C.	**Min Rate** inches W.C.	**Max Rate** inches W.C.	**Min Rate** inches W.C.
V53i (REU-VB2020FFU-US)					
#2 OFF, #3 OFF	0-2000 ft (0-610 m)	2.1 (54)	0.57 (14)	3.4 (87)	0.98 (25)
#2 OFF, #3 ON	2001-5200 ft (610-1585 m)	2.3 (58)	0.60 (15)	3.1 (79)	0.95 (24)
#2 ON, #3 OFF	5201-7700 ft (1585-2277 m)	2.0 (51)	0.60 (15)	3.0 (76)	1.0 (25)
#2 ON, #3 ON	7701-10200 ft (2277-3109 m)	2.0 (51)	0.60 (15)	2.8 (71)	1.0 (25)
R75LSi (REU-VB2528FFUD-US)					
#2 OFF, #3 OFF	0-2000 ft (0-610 m)	2.9 (74)	0.55 (14)	4.5 (114)	0.96 (24)
#2 OFF, #3 ON	2001-5200 ft (610-1585 m)	2.5 (64)	0.55 (14)	3.2 (81)	1.00 (25)
#2 ON, #3 OFF	5201-7700 ft (1585-2277 m)	2.6 (66)	0.60 (15)	3.5 (89)	1.00 (25)
#2 ON, #3 ON	7701-10200 ft (2277-3109 m)	2.4 (61)	0.55 (14)	2.8 (71)	0.95 (24)
R75LSe (REU-VB2528WD-US)					
#2 OFF, #3 OFF	0-2000 ft (0-610 m)	2.3 (58)	0.44 (11)	4.2 (107)	0.93 (24)
#2 OFF, #3 ON	2001-5200 ft (610-1585 m)	2.9 (74)	0.50 (13)	4.2 (107)	0.90 (23)
#2 ON, #3 OFF	5201-7700 ft (1585-2277 m)	2.9 (74)	0.45 (11)	3.8 (97)	0.80 (20)
#2 ON, #3 ON	7701-10200 ft (2277-3109 m)	2.9 (74)	0.50 (13)	3.3 (84)	0.90 (23)
R94LSi (REU-VB2735FFUD-US)					
#2 OFF, #3 OFF	0-2000 ft (0-610 m)	3.4 (86)	0.55 (14)	5.4 (137)	0.96 (24)
#2 OFF, #3 ON	2001-5200 ft (610-1585 m)	2.6 (66)	0.50 (13)	3.8 (97)	1.00 (25)
#2 ON, #3 OFF	5201-7700 ft (1585-2277 m)	2.6 (66)	0.60 (15)	3.5 (89)	1.00 (25)
#2 ON, #3 ON	7701-10200 ft (2277-3109 m)	2.5 (64)	0.65 (17)	2.9 (74)	1.00 (25)
R94LSe (REU-VB2735WD-US)					
#2 OFF, #3 OFF	0-2000 ft (0-610 m)	2.8 (71)	0.44 (11)	5.0 (127)	0.93 (24)
#2 OFF, #3 ON	2001-5200 ft (610-1585 m)	3.1 (79)	0.50 (13)	4.2 (107)	0.90 (23)
#2 ON, #3 OFF	5201-7700 ft (1585-2277 m)	3.0 (76)	0.50 (13)	4.1 (104)	0.90 (23)
#2 ON, #3 ON	7701-10200 ft (2277-3109 m)	3.0 (76)	0.50 (13)	3.7 (94)	0.80 (20)

Condensing Models

Dip Switch Setting	Altitude	Natural Gas (Gaz Naturel)				Propane Gas (Gaz propane)			
		MAX VENT Dip Switch #1 is OFF		MIN VENT Dip Switch #1 is ON		MAX VENT Dip Switch #1 is OFF		MIN VENT Dip Switch #1 is ON	
		Max Rate inches W.C.	Min Rate inches W.C.	Max Rate inches W.C.	Min Rate inches W.C.	Max Rate inches W.C.	Min Rate inches W.C.	Max Rate inches W.C.	Min Rate inches W.C.
RC80HPi (REU-KA2530FFUD-US)									
#2 OFF, #3 OFF	0-2000 ft (0-610 m)	3.00	0.81	2.90	0.70	3.80	1.11	3.7	1.06
#2 OFF, #3 ON	2001-5200 ft (610-1585 m)	2.90	0.70	3.20	0.70	3.80	0.90	3.9	0.70
#2 ON, #3 OFF	5201-7700 ft (1585-2277 m)	2.90	0.55	2.90	0.55	3.80	0.90	3.9	0.55
#2 ON, #3 ON	7701-10200 ft (2277-3109 m)	2.90	0.55	2.85	0.55	3.40	1.00	3.5	0.55
RC98HPi (REU-KA3237FFUD-US)									
#2 OFF, #3 OFF	0-2000 ft (0-610 m)	2.70	1.08	2.40	0.85	4.00	1.46	3.60	1.22
#2 OFF, #3 ON	2001-5200 ft (610-1585 m)	2.40	0.80	2.40	0.80	3.60	1.30	3.30	1.10
#2 ON, #3 OFF	5201-7700 ft (1585-2277 m)	2.40	0.80	2.40	0.80	3.60	1.20	3.30	1.10
#2 ON, #3 ON	7701-10200 ft (2277-3109 m)	2.40	0.80	2.40	0.90	3.20	1.10	3.20	1.00

Dip Switch Setting	Altitude	Natural Gas (Gaz Naturel)		Propane Gas (Gaz propane)	
		Max Rate inches W.C.	Min Rate inches W.C.	Max Rate inches W.C.	Min Rate inches W.C.
RC80HPe (REU-KA2530WD-US)					
#2 OFF, #3 OFF	0-2000 ft (0-610 m)	2.70	0.61	3.60	0.92
#2 OFF, #3 ON	2001-5200 ft (610-1585 m)	2.90	0.60	3.70	1.00
#2 ON, #3 OFF	5201-7700 ft (1585-2277 m)	2.90	0.60	3.70	1.00
#2 ON, #3 ON	7701-10200 ft (2277-3109 m)	2.90	0.60	3.40	1.00
RC98HPe (REU-KA3237WD-US)					
#2 OFF, #3 OFF	0-2000 ft (0-610 m)	2.20	0.63	3.10	1.00
#2 OFF, #3 ON	2001-5200 ft (610-1585 m)	2.20	0.70	3.10	1.00
#2 ON, #3 OFF	5201-7700 ft (1585-2277 m)	2.20	0.70	3.10	1.00
#2 ON, #3 ON	7701-10200 ft (2277-3109 m)	2.20	0.70	3.00	1.00

Dip Switch Settings

V Series

SW1 Bank

1	OFF - "Long Flue" ON - "Short Flue" and Outdoor Models "Long flue" is defined as: 0 elbows and length is greater than 21 ft 1 elbow and length is greater than 15 ft 2 elbows and length is greater than 9 ft
2	ON position
3	OFF position
4	OFF position
5	OFF position
6	OFF position
7	OFF position - Used for low fire and high fire settings. Refer to the gas pressure setting procedure.
8	

SW2 Bank

1	OFF - Propane Gas ON - Natural Gas
2	OFF position for models prior to these serial numbers: (on these units, the front panel does not have an "R" or "C" trade name, unless the front panel has been replaced) V1616W, V1616WC 06.02-000001 V2020W, V2020WC 05.07-000001 V2532W, V2532WC 05.05-117257 V2532FFU, V2532FFUC 05.05-117257 V2520FFU, V2520FFUC 05.05-109539 V2526W 05.05-110434 ON position for other models, serial numbers
3	OFF position
4	OFF - Residential Models ON - Commercial Models

VA Series (-US models; model name ends in –US; for -UC models refer to the next page)

SW1 Bank

1	OFF - "Long Flue" ON - "Short Flue" and Outdoor Models "Long flue" is defined as: 0 elbows and length is greater than 21 ft 1 elbow and length is greater than 15 ft 2 elbows and length is greater than 9 ft
2	Settings dependent on altitude
3	

0-2000 ft (0-610 m)	2001-5200 ft (610-1585 m)	5201-7700 ft (1585-2347 m)	7701-10200 ft (2347-3109 m)
#2: OFF	#2: OFF	#2: ON	#2: ON
#3: OFF	#3: ON	#3: OFF	#3: ON

4	OFF - if using MC-91 controller ON - if using MC-45 controller
5	OFF - 120ºF default temperature without a controller ON - 140ºF default temperature without a controller
6	OFF position
7	OFF position - Used for low fire and high fire settings. Refer to the gas pressure setting procedure.
8	

SW2 Bank (present on replacement PC boards only)

1	OFF - Propane Gas ON - Natural Gas
2	OFF - Outdoor model ON - Indoor model
3	OFF - R63LSe, R75LSe, R75LSi, R94LSe, R94LSi, R98LSe(ASME), R98LSi(ASME) ON - R50LSi, V53e
4	OFF - V53e, R63LSe, R94LSe, R94LSi, R98LSe(ASME), R98LSi(ASME) ON - R50LSi, R75LSe, R75LSi
5	OFF - V53e, R63LSe, R75LSe, R75LSi, R94LSe, R94LSi, R98LSe(ASME), R98LSi(ASME) ON - R50LSi
6	OFF position

Dip Switch Settings

VA Series (-UC Models; model name ends in –UC)

R75LSe-VA **REU-VA2528WD-UC**
R75LSi-VA **REU-VA2528FFUD-UC**
R94LSe-VA **REU-VA2535WD-UC**
R94LSi-VA **REU-VA2535FFUD-UC**

These models have a default maximum temperature of 120º F (49º C) and an option to increase the maximum temperature to 140 ºF (60 ºC). Temperature settings from 125-140 ºF (52-60 ºC) are available by setting dip switch 6 to ON in the SW1 bank of 8 dip switches. Other dip switch positions may be defined differently than for the non -UC models.

SW1 Bank

1	OFF - "Long Flue" ON - "Short Flue" and Outdoor Models "Long flue" is defined as: 0 elbows and length is greater than 21 ft 1 elbow and length is greater than 15 ft 2 elbows and length is greater than 9 ft
2	Settings dependent on altitude
3	

0-2000 ft (0-610 m)	2001-5200 ft (610-1585 m)	5201-7700 ft (1585-2347 m)	7701-10200 ft (2347-3109 m)
#2: OFF	#2: OFF	#2: ON	#2: ON
#3: OFF	#3: ON	#3: OFF	#3: ON

4	OFF - if using MC-91 controller ON - if using MC-45 controller
5	OFF - 120ºF default temperature without a controller ON - 140ºF default temperature without a controller
6	OFF - 120ºF maximum temperature without an MCC-91 controller ON - 140ºF maximum temperature without an MCC-91 controller
7	OFF position - Used for low fire and high fire settings. Refer to the gas pressure setting procedure.
8	

SW2 Bank (present on replacement PC boards only)

1	OFF - Propane Gas ON - Natural Gas
2	OFF - Outdoor model ON - Indoor model
3	OFF position
4	OFF position
5	OFF position
6	OFF position

Dip Switch Settings

VB and Condensing Series

R75LSe-VB, R75LSi-VB, R94LSe-VB, R94LSi-VB, V53i, RC80HPi, RC80HPe, RC98HPe, RC98HPi

SW1 Bank

<table>
<tr><td>1</td><td colspan="2">OFF - “Long Flue”
ON - “Short Flue” and Outdoor Models

“Long flue” is defined as:
0 elbows and length is greater than 21 ft
1 elbow and length is greater than 15 ft
2 elbows and length is greater than 9 ft</td></tr>
<tr><td>2</td><td colspan="2" rowspan="2">Settings dependent on altitude

<table><tr><td>0-2000 ft
(0-610 m)</td><td>2001-5200 ft
(610-1585 m)</td><td>5201-7700 ft
(1585-2347 m)</td><td>7701-10200 ft
(2347-3109 m)</td></tr><tr><td>#2: OFF</td><td>#2: OFF</td><td>#2: ON</td><td>#2: ON</td></tr><tr><td>#3: OFF</td><td>#3: ON</td><td>#3: OFF</td><td>#3: ON</td></tr></table></td></tr>
<tr><td>3</td></tr>
<tr><td>4</td><td colspan="2">OFF</td></tr>
<tr><td>5</td><td colspan="2">OFF - 120ºF default temperature without a controller
ON - 140ºF default temperature without a controller</td></tr>
<tr><td>6</td><td>R75LSe-VB, R75LSi-VB, R94LSe-VB, R94LSi-VB, RC80HPi, RC80HPe, RC98HPe, RC98HPi*
OFF - 120ºF maximum temperature without an MCC-91 controller
ON - 140ºF maximum temperature without an MCC-91 controller</td><td>V53i
OFF - Propane

ON - Natural Gas</td></tr>
<tr><td>7</td><td colspan="2" rowspan="2">OFF position - Used for low fire and high fire settings. Refer to the gas pressure setting procedure.</td></tr>
<tr><td>8</td></tr>
</table>

* R75LSe-VB, R75LSi-VB, R94LSe-VB, R94LSi-VB, RC80HPi, RC80HPe, RC98HPe, RC98HPi models have a default maximum temperature of 120º F (49º C) and an option to increase the maximum temperature to 140 ºF (60 ºC). Temperature settings from 125-140 ºF (52-60 ºC) are available by setting dip switch 6 to ON in the SW1 bank of 8 dip switches.

SW2 Bank (present on replacement PC boards only)
Note: Not present on V53i PC boards.

1	OFF - Propane Gas ON - Natural Gas
2	OFF - Outdoor model ON - Indoor model
3	OFF - R75LSe-VB, R75LSi-VB, R94LSe-VB, R94LSi-VB, RC98HPe, RC98HPi ON - RC80HPi, RC80HPe
4	OFF position
5	OFF position
6	OFF position

Notes

Notes

Notes

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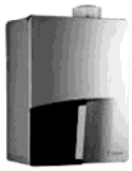

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